21220

S/126/61/011/003/007/017
E193/E483

26.2230

AUTHORS: Strekalovskiy, V.N., Bessonov, A.F., Vlasov, V.G. and Sidorenko, F.A.

TITLE: Phase Transformations During Reduction and Oxydation of Uranium Oxides

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.3, pp.400-403 + 1 plate

TEXT: The uranium-oxygen system has lately attracted a great deal of attention owing to the possibility of using uranium oxides (dioxide in particular) in the manufacture of ceramic fuel elements. However, the experimental work has been mainly confined to studies of oxydation or thermal decomposition of uranium oxides, and the object of the present investigation was to study (a) the kinetics of hydrogen reduction of amorphous UO_3 and green U_3O_8 at 300 to 700°C, (b) the process of oxydation of UO_2 in air, oxygen and CO_2 at 165 to 860°C and (c) the phase transformations taking place during these reactions. The results of the study of kinetics of the reduction process are reproduced schematically in Fig.1, where the rate of reduction (A in arbitrary units) is plotted against the overall composition of the

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resultant product, i.e. against the oxygen/uranium (O/U) ratio. It is pointed out, in this connection, that neither the rates of reduction of UO_3 and UO_8, nor the energy barriers during the crystallo-chemical transformations of these oxides are the same; thus, for instance, hydrogen reduction of UO_3 begins at 350°C, the corresponding temperature for UO8 being 450°C. In addition, reduction of UO_3 at temperatures $\leqslant$ 500°C practically ceases when the oxide reaches the oxide content corresponding to $UO_{2.33}$; at higher temperatures, U_4O_9 and oxides with a still lower oxygen content are produced. The results of the kinetic studies were correlated with the results of X-ray diffraction analysis of the products of the reduction of U_3O_8, and the following conclusions were reached regarding the phase transformations, taking place during the reduction process. In the initial stages, U_3O_8 gradually loses its oxygen, this process continuing until the starting material is reduced to 46.9% (100% reduction corresponding to complete conversion of UO_3 to UO_2) which corresponds to the overall composition of the product given by the formula $UO_{2.539}$; at this stage, the X-ray diffraction pattern still shows the

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lines of the U_3O_8 phase; the lattice parameters of the initial phase have changed but no lines of a new phase have yet appeared; at 62 and 69% reduction, the lines of the starting oxide are still present in the X-ray pattern and lines of the cubic U_4O_7 phase appear; at 75% reduction, the U_3O_8 lines completely disappear and only the U_4O_7 lines remain; after a further decrease in the oxygen content, the crystal structure of the oxide remains cubic but the lattice parameter increases. Reduction of UO_3 takes place in a similar manner, the crystalline U_3O_8 phase being formed directly from the amorphous UO_3 which does not pass through the crystalline form during this process. The whole reduction process can be represented in the following manner:

Amorphous $UO_3 \Rightarrow$ Solid solution, based on $UO_{2.67} \rightarrow UO_{2.2} \rightarrow UO_{2+x}$.

Regarding the process of oxydation of UO_2 in air or in oxygen, it can be represented by:

$UO_2 \rightarrow UO_{2+x} \rightarrow UO_{2.36 + 0.05} \rightarrow$ Solid solution, based on $UO_{2.67}$.

The tetragonal phases ($UO_{2.32 + 0.01}$, $UO_{2.35}$, $UO_{2.37}$, $UO_{2.41}$) whose presence can be inferred from the kinetics of the process studied, are unstable and decompose to form U_4O_9 and U_3O_8. When

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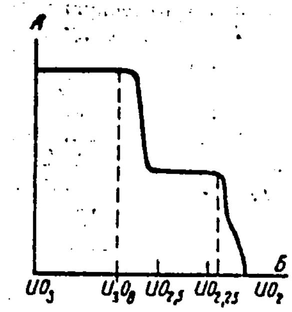
the oxydation reaction takes place (in air or oxygen) at temperatures $>400°C$, no formation of the tetragonal phases occurs, and the process proceeds according to:
$UO_2 \rightarrow UO_{2+x} \rightarrow UO_{2.25} \rightarrow$ Solid solution, based on $UO_{2.67}$.
Finally, it was established that UO_2 does not oxidize in carbon dioxide. There are 3 figures and 12 references: 8 Soviet and 4 non-Soviet.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M.Kirova (Ural Polytechnical Institute imeni S.M.Kirov)

SUBMITTED: July 18, 1960

Fig.1.



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24484
S/126/61/011/006/010/011
E193/E483

AUTHORS: Bessonov, A.F. and Vlasov, V.G.

TITLE: Phase transformations during oxidation of metallic uranium

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.6, pp.957-959

TEXT: The object of the present investigation was to study oxidation of uranium in air and carbon dioxide. To this end, specimens (4 x 2 x 15 mm), were degreased, pickled in concentrated HNO_3, washed in alcohol and held for 15 minutes in air at various temperatures between 20 and 350°C, or in CO_2 at 400 to 900°C, after which the surface of the specimens were examined by X-ray diffraction. The results are reproduced in Fig.1, showing the X-ray diffraction pattern of the surface of uranium specimens after (a) 8 days exposure to air at room temperature, (б) oxidation at 100°C, (в) oxidation at 205°C, (г) oxidation at 300°C, (д) oxidation at 350°C, (е) removal of the outer, loose, oxide layer. An X-ray diffraction pattern of uranium, oxidized in CO_2 is reproduced in the paper. The following conclusions were reached. 1) The phase transformations taking place during oxidation of

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uranium in air at 265 to 400°C can be represented by:

$U_{metal} \rightarrow \alpha\ UO_2 \rightarrow \alpha\ UO_{2+x} \rightarrow \beta\ UO_2 \rightarrow U_3O_7 \rightarrow$ solid solutions based on $UO_{2.67}$. 2) The constitution diagram of the U-O system is repeated in the phases which constitute the consecutive oxide layers of scale, formed on uranium in air at atmospheric pressure in the temperature interval studied. 3) Metallic uranium, heated in CO_2, oxidizes to UO_2 only. There are 2 figures and 8 references: 7 Soviet-bloc and 1 non-Soviet-bloc. The reference to an English language publication reads as follows: Blackburn P., Weissbart J., Gulbransen E., J.Phys.chem., 1958, 62, 8.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M.Kirova (Ural Polytechnical Institute imeni S.M.Kirov)

SUBMITTED: December 15, 1960

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Phase transformations ...

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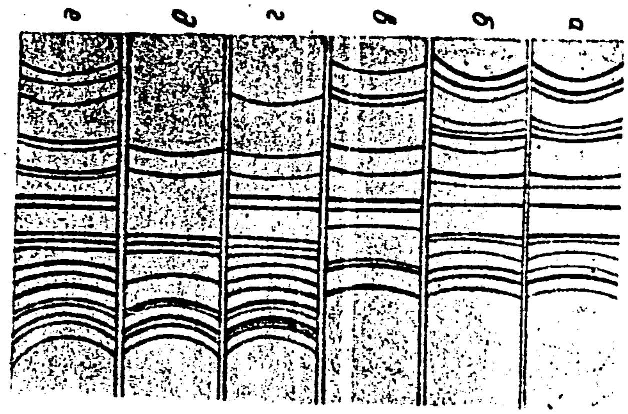
E193/E483

Fig.1.



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21.2100

24485
S/126/61/011/006/011/011
E073/E335

AUTHORS: Bessonov, A.F., Borisov, B.S. and Vlasov, V.G.

TITLE: Investigation of the Structure of the Primary Oxide Film on Uranium

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol. 11, No. 6, pp. 959 - 960

TEXT: In studying the mechanism of oxidation of metals investigation of the structure of the primary oxide film formed in air at room temperature during the initial oxidation period is of great importance. For some metals the structure of the films formed during the initial period of oxidation does not differ from those formed during later stages of oxidation. For a number of other metals, for instance, iron and its alloys, a film of a particular structure (type j-Fe_2O_3) forms during the initial period of oxidation. The primary oxide film is a protective one for most metals; it grows to some limit thickness, then stops growing and prevents further oxidation. The kinetics of growth of the primary films depends on a

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number of factors and so far no satisfactory theory on this process exists. The authors carried out investigations on uranium of 99.8% purity which, after rolling, was annealed at 850 °C for six hours in vacuum. Plate specimens 10 x 5 x 3 mm were initially ground with emery paper of varying coarseness and lapped by a ring using high-grade alumina. After polishing the ring was moistened with benzol or ethyl alcohol to prevent access of air to the polished surface. Microscopic investigations have shown that the surface was peppered with fine crystals and the number and size of the crystals increased rapidly. For determining the structure of this primary film electron-diffraction studies were made. For removing the scale films the specimens were etched in nitric acid for 10 min and then washed several times in ethyl alcohol. Oxidation was in air at room temperature for durations of 10, 30, 120 and 240 min. In the second series of experiments, the specimen, after having been taken out of the alcohol (wet), was placed immediately into the chamber of the electron-diffraction

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apparatus from which the air was evacuated so that the specimen surface interacted only with the air which remained in the chamber of the electron-diffraction camera. Part of the specimens were subjected to electron-diffraction investigations immediately after polishing (without etching); back reflection pictures were taken. The obtained interplane distances were compared with X-ray data, obtained by the powder method for uranium oxides. The investigations revealed a cubic phase on uranium oxide with a lattic constant of a = 545 Å for all the specimens, which corresponds to the oxide UO_2. In a second series of experiments the electron-diffraction patterns contained reflexes from the metallic uranium in addition to lines of the phase UO_2. This indicates that in this case the entire thickness of the oxide film participated in the diffraction and that the primary oxide film of uranium consists solely of the phase UO_2. From the widening of the Debye lines the size of the forming UO_2 crystals could be determined, which was about 10^{-4} cm. Thus,

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BESTAL, V.

24485

SURNAME (in caps); Given Names

(2)

Country: Yugoslavia

Academic Degrees: /not given/

Affiliation: Veterinary Station (Veterinarska stanica), Imotski

Source: Belgrade, Veterinarski glasnik, No 6, 1961, pp 529-531.

Data: "Field Ruminotomy in Nontraumatic Indigestion Just Before Calving."

Authors:

BESTAL, V.
BERTAPELE, D.

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S/126/61/012/003/011/021
E193/E135

AUTHORS: Bessonov, A.F., and Vlasov, V.G.

TITLE: Concerning the mechanism of oxydation of metallic uranium

PERIODICAL: Fizika metallov i metallovedeniye, vol.12, no.3, 1961, 403-408

TEXT: Effective measures against oxydation during the preparation of metals or in service can be applied only if the mechanism of this process is properly understood. Hence the present investigation, in which the kinetics of oxydation of uranium were studied by the gravimetric method and the constitution of the scale formed on uranium under various conditions was determined by X-ray diffraction, microscopic, and electron diffraction analyses. The experiments were carried out on 99.8% pure uranium specimens, degreased, pickled in concentrated HNO_3, and washed in ethyl alcohol. The oxydation tests were carried out in dry air and oxygen at various temperatures and pressures; some results are reproduced graphically. In Fig.1 the specific increase in weight ($\Delta m/s \times 10^4$, mg/cm^2) of uranium

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heated in air is plotted against time (minutes), curves 1-6 relating to tests conducted at 250, 300, 350, 400, 600 and 760 °C respectively. The kinetics of oxydation of uranium in oxygen are illustrated in the same manner in Fig.2, where curves 1-4 relate to results obtained at 250, 300, 350 and 400 °C. It was established that the effect of pressure (p, mm Hg) on the rate of oxydation (v, mg/cm^2) in minutes of uranium in air at 400 °C is described by

$$v = a_1 \sqrt{p} \qquad (3)$$

for pressures higher than 200 mm Hg, and by

$$v = a_2 p \qquad (4)$$

for pressures lower than 200 mm Hg. The oxydation rate of uranium in oxygen at 300 °C under pressures ranging from 5 to 550 mm Hg is given by $v = a_3 \sqrt{p}$.

The rate of oxydation was not affected at all by forced circulation of oxygen and only to a small extent by circulation of air at pressures > 200 mm Hg; at p < 200 mm Hg forced

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circulation of air increased the oxydation rate, this effect becoming more pronounced at higher temperatures. The activation energy of the process studied was 18 and 4.6 kcal/mol, when the reaction took place in air below and above 400 °C, respectively, and 17 kcal/mol for oxydation in oxygen below 400 °C. The oxide film formed on uranium in air at room temperature had a crystalline structure and consisted exclusively of UO_2. The constitution of scale formed on uranium in air at 260-400 °C was determined by the present authors in an earlier investigation: the composition of the consecutive layers starting from metallic titanium (U_{met}) is

$$U_{(met)} \rightarrow \alpha\ UO_2 \rightarrow \alpha\ UO_{2+x} \rightarrow \beta\ UO_2(U_4O_9) \rightarrow U_3O_7 \rightarrow U_3O_8$$

Although the molecular volume, U_o, of uranium oxide is larger than the atomic volume, U_m, of uranium, the oxide scale formed on this metal does not protect it from further oxydation. This is attributed by the present authors to the coarsely-crystalline nature of the oxide film formed at room temperature, and also to the fact that large internal stresses are set up in the oxide film

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owing to the large difference between the specific volumes of the uranium oxide and uranium whose ratio varies between 1.9 and 2.6. To determine the relative roles played in the oxydation of uranium by the diffusion of oxygen and metal, tests were carried out in air at 350 °C on specimens fitted with inert platinum markers in the form of 0.02 mm thick wire; irrespective of the duration of the test, the platinum marker remained on the surface of the oxide scale. The results of the present investigation are discussed in relation to various published data and it is concluded that diffusion of oxygen through the dense triplex $\alpha UO_2 \rightarrow \alpha UO_{2+x} \rightarrow \beta UO_2(U_4O_9)$ layer of oxides with a cubic crystal lattice which adheres strongly to uranium, governs the kinetics of oxydation of uranium. There are 4 figures and 15 references: 10 Soviet-bloc and 5 non-Soviet-bloc. The English language references read as follows:

Ref.5: N.B. Pilling, R.E. Bedworth. Inst. Met., 529, Vol.29, 1923.
Ref.7: P. Blackburn, I. Weissbart, E.I. Gulbransen. Phys. Chem., 1958, Vol.62, 8.
Ref.10: F.I. Gronvold, Inorg. Nucl. Chem., 1955, Vol.1, 357.

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Concerning the mechanism of oxydation... S/126/61/012/003/011/021
E193/E135

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M. Kirova (Ural Polytechnical Institute imeni S.M. Kirov)

SUBMITTED: February 6, 1961

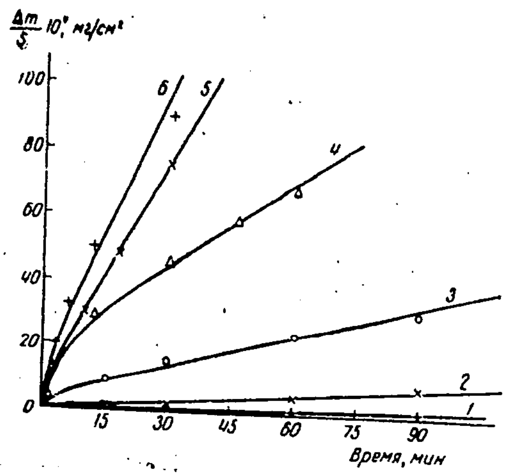

Fig. 1

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BESSONOV, A.I.; VLASOV, V.G.

Interaction of uranium metal with carbon dioxide. Fiz. met. i metalloved. 12 no.5:775-778 N '61. (MIRA 14:12)

1. Ural'skiy politekhnicheskiy institut imeni S.M.Korova.
(Uranium--Metallography)
(Carbon dioxide)

VLASOV, V.G.; SHALAGINOV, V.N.; BESSONOV, A.F.; STREKALOVSKIY, V.N.

Change of the design of a glass pressure regulator. Trudy Ural. politekh.inst.no.121:102-103 '62.

(MIRA 16:5)

(Pressure regulators)

39932
S/149/62/000/004/002/003
A006/A101

21.2100

AUTHORS: Bessonov, A. F., Vlasov, V. G.

TITLE: Kinetics of uranium oxidation with air, oxygen and carbon dioxide

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, no. 4, 1962, 137 - 142

TEXT: Oxidation of uranium metal was studied in aggressive gas media at various temperatures and pressures of the oxidizing gas, for the purpose of obtaining kinetic characteristics and revealing the mechanism of the process. Commercially pure uranium metal plates (2.5x1.5x1.5 mm) were oxidized in a high-vacuum device. The true rate of the oxidation process was graphically determined from the inclination angle of the tangent to the "oxidation degree-versus-time" curve. The apparent activation energy was calculated with the aid of the Arrhenius equation. The average composition of the oxidation product was determined by calculating the increase in weight of the specimen during oxidation and the loss in weight during reduction with hydrogen. It was found that the oxidation process in all the given aggressive media obeys the temporary linear law; the rate of the process is proportional to the square root from air and oxygen pressure. The possible mechanism of the uranium oxidation is analyzed with the aid of Soviet and foreign

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sources (Ref. 9: P. Chiotti, H. Klepfer, R. White. Trans.Amer.Soc.Metals, 51, 772 (1959)). It was found that the diffusion of oxygen atoms through a dense layer of uranium dioxide was the decisive limiting stage. There are 4 figures.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

SUBMITTED: July 25, 1960

X

STREKALOVSKIY, V.N.; BESSONOV, A.F.; ZHUKOVSKIY, V.M.; NEUYMIN, A.D.

Electric properties of uranium oxides. Trudy Inst. elektro-khim. UFAN SSSR no.3:155-159 '62. (MIRA 16:6)

(Uranium oxides—Electric properties)

S/149/62/000/005/004/008
A006/A101

AUTHORS: Vlasov, V. G., Bessonov, A. F.

TITLE: Oxidation of uranium dioxide

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Tsvetnaya metallurgiya, no. 5, 1962, 113 - 122

TEXT: Since the opinions of scientists differ on the mechanism of the oxidation process of uranium dioxide, the gathering of experimental data in this field is imperative. The authors studied kinetics of uranium dioxide oxidation in different gas media and investigated simultaneously the effect of the admixture of alkali metal carbonates and ThO_3, ZrO_2 and TiO_2 oxides upon the kinetic characteristics of the oxidation process. Kinetics of oxidation with air oxygen was studied within a range of 165 to 800°C, at 2.5 - 600 mm Hg atmospheric pressure. The results are shown in Graph (2). Determined values of the apparent activation energy at different oxidation degrees range from 34.6 kcal/mole at 28% oxidation to 39.4 kcal/mole at 90% oxidation. Kinetic characteristics of UO_2 oxidation with pure oxygen were investigated in a range of 125 to 330°C and

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P_{O_2} = 100 mm Hg. The following schemes of phase transformations are proposed: $UO_{2.04} \rightarrow UO_{2+x_{max}} \rightarrow UO_{2.25} - UO_{2.36\pm0.05} \rightarrow UO_{2.6-x_{max}} \rightarrow UO_{2.67}$ for the 260 to 390°C range, and $UO_{2.04} \rightarrow UO_{2+x_{max}} \rightarrow UO_{2.25} \rightarrow UO_{2.6-x_{max}} \rightarrow UO_{2.67}$ for the 400 to 800°C range. The effect of different admixtures upon the process is given in Figures 5 and 6. Due to the liberation of considerable amounts of heat in oxidation of UO_2 to U_3O_8, local overheating occurs in the solid phases, entailing a sharp increase in the process rate on these spots, so that several phase transitions take place. This explains the jumplike evolution of the process in the 150 - 200°C range. The inhibiting effect of K_2CO_3 admixtures on UO_2 oxidation at 185°C is apparently due to the fact that at this temperature the migration of potassium ions from the carbonate crystal lattice into that of UO_2 is little probable. Simultaneously the admixture is in a close contact with UO_2 and screens a portion of its surface. As a result, the surface for oxygen adsorption from the gaseous phase is reduced and the total rate of the oxidation process decreases. At 330°C the accelerating effect of alkali metal carbonates appears on those stages where a substantial reconstruction of the crystal lattice takes place. Apparently the catalytic effect of carbonates consists in the fact that

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Oxidation of uranium dioxide

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A006/A101

their particles are crystallization centers of a new phase which eliminates the induction period. There are 6 figures.

ASSOCIATION: Ural'skiy politekhnicheskiy institut (Ural Polytechnic Institute)

SUBMITTED: April 22, 1961

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Oxidation of uranium dioxide

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A006/A101

Figure 2. Isotherms of UO_2 oxidation with air oxygen (at constant 200 mm Hg air pressure)

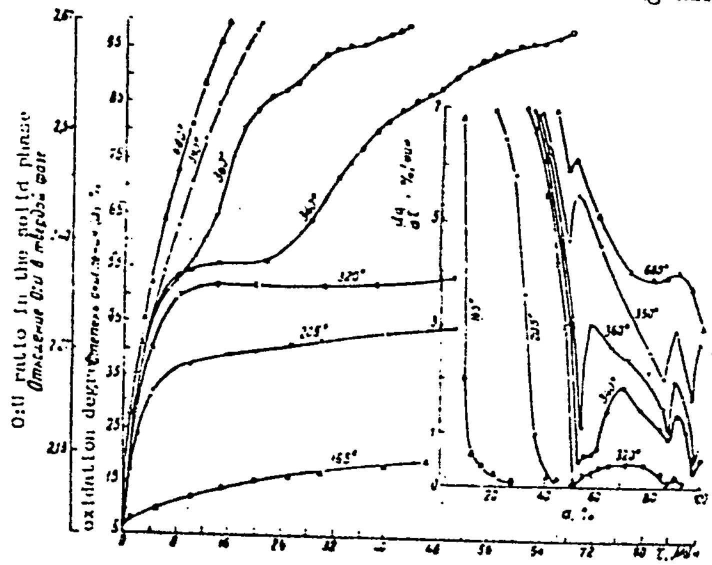

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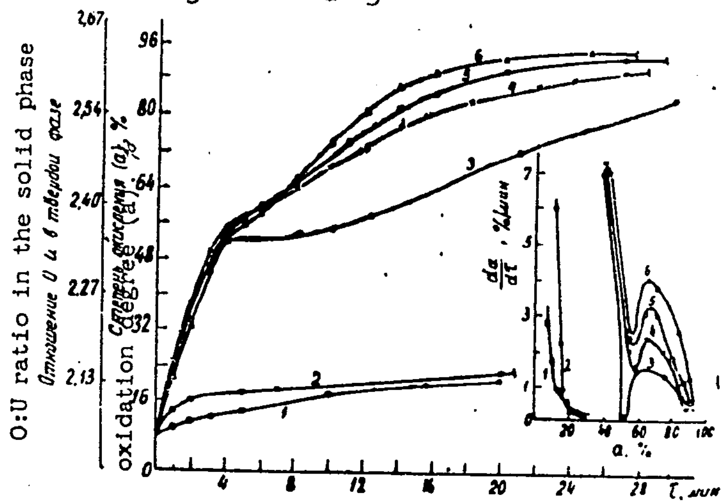
Figure 5. Isotherms of UO_2 oxidation with air oxygen at 185°C (1 and 2) and at 330°C (3 - 6) without admixtures (2 and 3) and with admixtures of K_2CO_3 (1 and 4), Na_2CO_3 (5); Li_2CO_3 (6).



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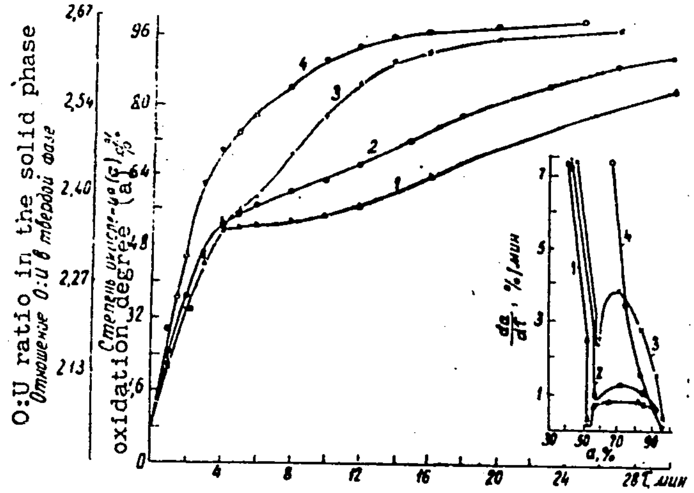
Oxidation of uranium dioxide

S/149/62/000/005/004/008
A006/A101

Figure 6. Isotherms of UO_2 oxidation with air oxygen at 330°C without admixture (1) and with admixture of ThO_2 (2); ZrO_2 (3) and TiO_2 (4)



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S/126/62/014/003/021/022
E039/E420

AUTHORS: Bessonov, A.F., Vlasov, V.G.

TITLE: The interaction of uranium with nitrogen

PERIODICAL: Fizika metallov i metallovedeniye, v.14, no.3, 1962, 478-479

TEXT: The kinetic processes of oxidation have been investigated previously by the authors. This is a continuation and the formation of uranium nitride is investigated. The apparatus and method is described in the previous paper, the nitrogen gas being obtained from liquid nitrogen and purified by passing over titanium at 800°C and $CaCl_2$. The basic investigation is carried out at 200 mm Hg in the temperature range 400 to 920°C. Initially the reaction proceeds parabolically with time for about 0.5 min and then continues linearly for all temperatures. No reaction is observed below 400°C. At 590 and 710°C the rate of reaction is proportional to the square root of the pressure. Circulation of the nitrogen does not produce any effect on the reaction rate. The activation energy of the process at 630°C is 16 kcal/mole and at higher temperatures 7 kcal/mole.

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X-ray analysis of the nitride formed at 920°C shows that it has a face-centred cubic lattice. The initial rate of reaction is modified by the presence of the UO_2 layer on the uranium surface and the linear part is associated with the diffusion of the nitrogen through the nitride layer. It is suggested that the square root dependence of the rate of reaction on pressure is due to the dissociation of the nitrogen molecules into atoms during the diffusion process through the nitride layer. The decrease in activation energy above 630°C is explained on the basis of the U_α to U_β transition. There is 1 figure.

S/080/62/035/003/017/024
D202/D302

AUTHORS: Bessonov, A. F., Vlasov, V. G. and Strekalovskiy, V. N.

TITLE: Cyclic oxidation-reduction of uranium oxides

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 3, 1962, 657-660

TEXT: The subject of this study was the elucidation of the following questions: 1) Which phases are formed during the oxidation and reduction processes of active uranium dioxide and urano-uranium oxide? 2) Can the tetragonal phase be obtained at temperatures below 400 - 500°C? 3) The oxidation kinetics of active uranium dioxide, unstable at room temperature. The work is a repetition of investigations previously published by Western scientists. The authors state that their results are in good agreement with those given in Western literature. The following phases were found during the cyclic oxidation and reduction of uranium oxides in the temperature range from 20 to 500°C: UO_2, $UO_{2\pm X}$, $UO_{2.25}$, $UO_{2.36\pm X}$, $UO_{2.6\pm X}$, $UO_{2.67}$. The tetragonal phase does exist as a stable one

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S/080/62/035/003/017/024
Cyclic oxidation-reduction ... D202/D302

at some definite temperature range between 500°C and room temperature. There are 3 figures and 8 references: 1 Soviet-bloc and 7 non-Soviet-bloc. The 4 most recent references to the English-language publications read as follows: R. W. Willardson, I. Moody and H. Goering, J. Inorg. Nuclear Chem., 6, 19-38, 1958; O. Runnols, Nucleonics, 17, 104-111, 1959; A. Arrot and I. Goldman, Phys. Rev., 108, 948, 1957; P. Blackburn, I. Weissbart and E. Gulbransen, J. Phys. Chem., 62, 8, 12, 1958.

SUBMITTED: January 16, 1961

Card 2/2

STREKALOVSKIY, V.N.; NEUYMIN, A.D.; BESSONOV, A.F.

Electric conductivity of higher uranium oxides in a hydrogen stream. Zhur. fiz. khim. 36 no.6:1355-1358 Je'62 (MIRA 17:7)

1. Institut elektrokhimii Ural'skogo filiala AN SSSR.

S/126/63/015/003/024/025
E039/E435

AUTHORS: Bessonov, A.F., Vlasov, V.G.

TITLE: On the question of the high temperature oxidation of metallic uranium

PERIODICAL: Fizika metallov i metallovedeniye, v.15, no.3, 1963, 477-478

TEXT: The oxidation of uranium by CO_2 at temperatures above 900°C is investigated. The uranium (technical purity 99.8%) in the form of plates is first degreased in benzene, etched with cold concentrated nitric acid and then thoroughly washed in ethyl alcohol. Isotherms are measured at temperatures of 900, 950 and 1000°C for a CO_2 pressure of 420 mm Hg. It is shown that the dependence of the rate of oxidation of uranium on the pressure of CO_2 is given by

$$v = aP_{CO_2}^{n} \quad (1)$$

where $n = \frac{1}{4}$; a is a temperature constant; P_{CO_2} is the pressure of CO_2. It is also shown that the rate of circulation of CO_2 has practically no effect on the reaction rate. The

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On the question of the high ... S/126/63/015/003/024/025
E039/E435

disintegration of the sample is caused by the phase changes $U_\gamma \xrightarrow{772^\circ} U_\beta$ which produces an increase in volume and $U_\beta \xrightarrow{672^\circ} U_\alpha$ which produces a decrease in volume. X-ray diffraction analysis shows that there is a layer of UO on the surface of the UO_2. This is also detected chemically together with the mono-nitride and mono-carbide in the surface scale of uranium oxidized at CO_2 at 1000°C. The catalytic effect of UO_2 is demonstrated by comparing the rates of oxidation of pure iron powder and a mixture of iron powder and UO_2 (20% by wt Fe). The UO_2 produces a significant increase in the rate of oxidation of the iron. When the temperature of uranium is increased from 900 to 1000°C the rate of oxidation decreases owing to an increase in density of the UO_2. At temperatures < 780°C the oxidation is accomplished by oxygen diffusing through the oxide layer but at temperatures > 900°C the rate of diffusion of the metal through the scale becomes significant. There are 2 figures.

ASSOCIATION: Ural'skiy politekhnicheskiy institut im. S.M.Kirova (Ural Polytechnical Institute imeni S.M.Kirov)

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On the question of the high ... S/126/63/015/003/024/025
E039/E435

SUBMITTED: September 2, 1962 (initially)
October 6, 1962 (after revision)

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BESSONOV, A.F.; UST'YANTSEV, V.M.

Effect of the surface state of particle layers on the sintering process of magnesite powders. Porosh. met. 5 no.5:20-23 My '65. (MIRA 18:5)

1. Vostochnyy nauchno-issledovatel'skiy i proyektnyy institut ogneupornoy promyshlennosti, Sverdlovsk.

L 1253-66 EWP(e)/EWT(m)/T WH

ACCESSION NR: AP5021510 UR/0131/65/000/008/0030/0034
666.76.0012

AUTHOR: Bessonov, A. F.; Ust'yantsev, V. M.

TITLE: Investigation of phase changes in the systems of $MgO-Fe_2O_3$ and $MgO-FeO(Fe_2O_3)$ during heating and cooling in air

SOURCE: Ogneuproy, no. 8, 1965, 30-34

TOPIC TAGS: refractory compound, magnesium oxide, iron oxide, electric resistance, phase analysis, solid kinetics

ABSTRACT: The article considers phase changes and chemical interactions under nonequilibrium conditions, that is, under the actual operating conditions of these refractory materials. A special apparatus permitted simultaneous measurement of electrical resistance and X-ray analysis of the samples at different temperatures. The compositions of the samples were: 90% MgO and 10% Fe_2O_3 and 90% MgO and 10% FeO. The samples were prepared in tablet form 3-4 mm thick by mixing finely ground powders, with subsequent pressing. The samples were placed in a high temperature chamber which permitted heating to 1500 C, with

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205120007-4"

L 1253-66

ACCESSION NR: AP5021510

attachment of a URS-501 diffractometer. They were heated at a rate of 0.17 degrees/sec with practically no temperature gradient across the sample. The phase composition of each sample was studied by continuous X-ray photography in the angular range of 20°-$27^{\circ}30'$. For some samples complete X-ray photos were taken over the angular range of 11-41°. The same measurements were made with cooling of the samples and subsequent reheating. Results for both types of samples in the given temperature interval are shown graphically. Basically, the article gives a qualitative picture of the kinetics of phase changes in the systems MgO-Fe_2O_3 and MgO-$FeO(Fe_2O_3)$ at atmospheric air pressure and with continuous heating to 1400 C. In particular, it is shown that magnesioferrite under these conditions forms at 290 C. Orig. art. has: 8 figures

ASSOCIATION: Vostochnyy institut ogneuporov (Eastern Institute for Refractory Materials)

SUBMITTED: 00

ENCL: 00

SUB CODE: MM, IC

NR REF SOV: 006

OTHER: 005

Card 2/2

BESSONOV, A.F.; UST'YANTSEV, V.M.; YAROSLAVTSEV, A.S.

Investigating the kinetics of phase transformations in a specimen of magnesium and copper oxides. Izv. vys. ucheb. zav.; tsvet. met. 8 no.5:49-53 '65. (MIRA 18:10)

1. Ural'skiy politekhnicheskiy institut, kafedra metallurgii tyazhelykh tsvetnykh metallov i Vostochnyy institut ogneuporov.

BESSONOV, A.S., kand.veter.nauk

Diagnosis of trichinelliasis. Veterinariia 41 no.10:85-86 O '64. (MIRA 18:11)

1. Vsesoyuznyy institut gel'mintologii imeni akademika Skryabina.

L 53592-65 EWG(j)/EWA(k)/EWT(l)/EWT(m)/EWP(w)/EPF(c)/EWA(d)/EPR/EEC(t)/T/ EWP(t)/EWP(b) Pr-4/Ps-4 IJP(c) JD/LHB

ACCESSION NR: AP5012504 UR/0032/65/031/005/0620/0621
539.16.07

AUTHORS: Bessonov, A. F.; Ust'yantsev, V. M.

TITLE: A device for the simultaneous high temperature plotting of curves of electrical conductivity and x-ray patterns of solid oxides

SOURCE: Zavodskaya laboratoriya, v. 31, no. 5, 1965, 620-621

TOPIC TAGS: x ray diffraction study, oxide, electric conductivity, high temperature instrument, measuring apparatus / 3G 1 audio frequency generator, RNSH 55 autotransformer, SNE 220 0.75 voltage regulator, PSR 03 automatic potentiometer, PP potentiometer, URS 501 goniometer, URS 501M goniometer

ABSTRACT: A device was developed for providing simultaneous x-ray analysis and electrical conductivity measurements of solid oxides at high temperatures. By making the two types of measurements simultaneously, the problem of the congruence of these measurements at high temperatures has been eliminated. The electrical conductivity measurements are made with a standard Wheatstone bridge (Fig. 1 on the Enclosure) in which R_3 is the regulated resistance for determining the resistance R_x of the specimen, and R_4 is the standard resistance for periodically

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L 53592-65

ACCESSION NR: AP5012504

calibrating the bridge. A capacitor box (1) is connected to one leg. A 3G-1 audio frequency generator (1000-5000 cps) in one diagonal prevents pre-electrode polarization. An oscillograph (3) in the other bridge diagonal serves as a zero indicator. An RNSH-55 autotransformer (6) controls the heater located in the high temperature chamber (5). A SNE-220-0.75 voltage regulator (7) eliminates voltage fluctuations. A PSR-03 automatic potentiometer (8) is used for recording and regulating the specimen temperature, and a PP potentiometer (9) is used for fine (±3C) temperature measurements. The heater (70% Pt + 30% Rh) can heat the horizontal tubular furnace (attached to the water-cooled casing) up to temperatures of 1500C. The x-ray camera, which can be positioned in two dimensions by two runners, is mounted on either a URS-501 or a URS-501M goniometer. The corundum heater block has a 10-12-mm hole in which the specimen is placed for its conductivity measurement. The furnace is surrounded by lightweight bricks and its ends are sealed with thermal insulation disks. The x-ray beam slits are covered with nickel foil. There are two slit variations: the side slit permitting an angular range of 50°; the end slit with an angular range of 72° with unit URS-501 or of 82° with URS-501M. In test measurements, in addition to the Pt-PtRh thermocouple, temperatures were controlled by studying the x-ray patterns of platinum, which vary with temperature in a known way. Test measurements gave excellent results.

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L 53592-65
ACCESSION NR: AP5012504

Orig. art. has: 2 figures.

ASSOCIATION: Vostochnyy nauchno-issledovatel'skiy i proyektnyy institut ogneupornoy promyshlennosti (Eastern Scientific Research and Design Institute of the Refractory industry)

SUBMITTED: 00 ENCL: 01 SUB CODE: TD, EM

NO REF SOV: 003 OTHER: 000

Card 3/4

BESSONOV, A.F.; STREKALOVSKIY, V.N.; NEUYMIN, A.D.; UST'YANTSEV, V.M.

Uranium dioxide oxidation studied by the high-temperature methods of electric conductivity, X-ray diffraction, and continuous weighing. Zhur.fiz.khim. 39 no.7:1708-1711 Jl '65.

(MIRA 18:8)

L 1657-66 EWT(m)/EPF(n)-2/EWG(m)/EWP(t)/EWP(b) IJP(c) RDW/JD/WW/JG

ACCESSION NR: AP5021417

UR/0076/65/039/008/1932/1937

541.13+541.17

32

31

B

AUTHOR: Bessonov, A. F.; Ust'yantsev, V. M.

TITLE: Study of certain oxide systems with the aid of a high-temperature device for the simultaneous measurement of the electrical resistance and x-ray diffraction analysis of samples

SOURCE: Zhurnal fizicheskoy khimii, v. 39, no. 8, 1965, 1932-1937

TOPIC TAGS: electrical resistance measurement, x-ray diffraction analysis, zirconium oxide, phase analysis

ABSTRACT: The properties of ZrO_2 - MgO and ZrO_2 - Y_2O_3 compositions (taken in the ratio of 73:25 and 93:7 mole % respectively), which were pressed and sintered at 1600°C, were studied as a function of temperature by means of a novel device which permitted the simultaneous measurement of electrical resistance and x-ray diffraction analysis. A wiring diagram of the device is given. The phase transformations of ZrO_2 were investigated, and the electrical resistance method was found to be more sensitive than the x-ray method in the identification of the phases formed during

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ACCESSION NR: AP5021417

heating or cooling, since it detected their formation earlier and was sensitive to their presence for a longer time. Furthermore, inflections occurring at 550°C and 490°C on the resistance curve had no equivalents in the x-ray studies. It is concluded that the resistance method is highly sensitive to slight structural changes arising under the influence of external factors such as temperature, medium, pressure, or chemical reactions. The two all-important methods of x-ray diffraction and electrical resistance measurement can thus be made to supplement each other in a highly useful manner. Orig. art. has: 6 figures and 1 table.

ASSOCIATION: Vostochnyy nauchno-issledovatel'skiy i proyektnyy institut ogneupornoy promyshlennosti (Eastern Scientific Research and Planning Institute of the Refractory Industry)

SUBMITTED: 14Apr64 ENCL: 00 SUB CODE: GC, IC

NO REF SOV: 012 OTHER: 005

Card 2/2 DP

L 10880-66 EWP(e)/EWT(m)/EPF(n)-2/T/EWP(t)/EWP(b)/EWA(c) IJP(c) JD/WW/JG/WH

ACC NR: AT5028247 SOURCE CODE: UR/2631/65/000/006/0123/0130

AUTHOR: Strekalovskiy, V. N.; Bessonov, A. F.; Ust'yantsev, V. M.; Burov, G. V.

ORG: Institute of Electrochemistry, Ural Branch, Academy of Sciences SSR (Akademiya nauk SSR, Ural'skiy filial, Institut Elektrokhimii)

TITLE: High-temperature x-ray diffraction study of oxide ceramics

SOURCE: An SSSR. Ural'skiy filial. Institut elektrokhimii. Trudy, no. 6, 1965. Elektrokhimiya rasplavlennykh solevykh i tverdykh electrolitov (Electrochemistry of fused salts and solid electrolytes), 123-130

TOPIC TAGS: x ray diffraction analysis, oxide ceramic, cerium compound, strontium compound, zirconium compound, yttrium compound, neodymium compound

ABSTRACT: A description is given of high-temperature attachments for x-ray diffraction studies with photo- and ionization recording of the diffraction pattern (at temperatures between 20 and 1500C). Examples of high-temperature x-ray analyses are given for sintered oxide materials: CeO_2, CeO_2-SrO, ZrO_2-Y_2O_3, ZrO_2-Nd_2O_3, ZrO_2-CaO. The transitions occurring in ZrO_2-Nd_2O_3 and ZrO_2-Y_2O_3 on heating and cooling are determined. The x-ray coefficients of thermal expansion of these samples are found to be lower than the dilatometric ones. It is postulated that the difference in the change of the lattice constant of CeO_2 as

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L 10880-66

ACC NR: AT5028247

studied in air and vacuum is due to the formation of a solid solution of Ce_2O_3 in CeO_2 in a vacuum. Orig. art. has: 8 figures and 1 table.

SUB CODE: 07, 11/ SUBM DATE: none/ ORIG REF: 008/ OTH REF: 011

Card 2/2

ACC NR: AP6036904 SOURCE CODE: UR/0226/66/000/011/0072/00..

AUTHOR: Bessonov, A. F.; Taksis, G. A.; Semavin, Yu. N.

ORG: Uralsk Polytechnic Institute im. S. M. Kirov (Ural'skiy politekhnicheskiy institut)

TITLE: Investigation of solid phase reactions with the aid of a micrometric dilatometer

SOURCE: Poroshkovaya metallurgiya, no. 11, 1966, 72-76

TOPIC TAGS: chemical reaction, solid phase reaction, dimension analysis, micrometric dilatometer, dilatometer, calcium carbonate, cuprous oxide, iron oxide, material deformation, aluminum oxide, zirconium oxide

ABSTRACT: A schematic diagram is presented for a high-temperature complex micrometric dilatometer. Use of this dilatometer, makes it possible to analyze in addition to changes in linear dimensions the sequence of processes which occur in samples of $MgO + FeO$, $MgO + Cu_2O$, $Al_2O_3 + Cu_2O$, and $ZrO_2 + CaCO_3$ on heating. The special characteristics of these processes are determined for temperature regions of existence of various phases, areas of pronounced shrinkage

1/2

VLASOV, V.G.; BESSONOV, A.F.

Oxidation of uranium dioxide by air in the presence of added carbonates and oxides. Kin.i kat. 4 no.5:666-671 S-O '63.
(MIRA 16:12)

1. Ural'skiy politekhnicheskiy institut imeni S.M.Kirova.

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205120007-4"

STRELOV, K.K.; BESSONOV, A.F.

Classification of porosities in refractory materials.
Ogneupory 28 no.10:469-471 '63. (MIRA 16:11)

1. Vostochnyy institut ogneuporov.

28(5)

S/146/59/002/06/009/016
D002/D006

AUTHOR: Bessonov, A.G., Candidate of Technical Sciences

TITLE: Determining the Kinematically and Dynamically Advantageous Parameters of a Gyromotor Rotor by the Method of Dimensionless Coefficients

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborotroyeniye, 1959, Nr 6, pp 61-67 (USSR)

ABSTRACT: This is a mathematical determination of the rotor parameters on which the following rotor requirements depend: smallest possible weight, maximum possible axial inertia moment, smallest possible aerodynamic resistance of the turning rotor in the gyroframe, etc. The proposed method of evaluating the rotor shape for determining the best relations between rotor dimensions by means of kinetic and dynamic relations can, in some cases, be simplified and

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S/146/59/002/06/009/016
D002/D006

Determining the Kinematically and Dynamically Advantageous Parameters of a Gyromotor Rotor by the Method of Dimensionless Coefficients

improved. The basic method can be applied to rotors of any configuration. The article was recommended by the Kafedra teoreticheskoy mekhaniki (Chair of Theoretical Mechanics). There are 3 Soviet references.

ASSOCIATION: Leningradskiy institut aviatsionnogo priborostroyeniya (Leningrad Institute of Aeronautical Instrument Building).

SUBMITTED: September 25, 1959

Card 2/2

BESSONOV, A.G.

Aerodynamic resistance of gyromotors and ways to reduce it.
Vop. prikl. gir. no.2:38-52 '60. (MIRA 15:4)
(Gyroscopic instruments) (Aerodynamics)

S/146/60/003/01/009/016
D002/D006

28(5)
1(1)

AUTHOR: Bessonov, A.G., Candidate of Technical Sciences

TITLE: On the Determination of Aerodynamic Resistance and Friction in the Axle Supports of a Gyromotor by the Coasting Method Using a Vacuum

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborostroyeniye, 1960, Vol 3, Nr 1, pp 61-68 (USSR)

ABSTRACT: The author suggests a new method for determining the coefficients of aerodynamic resistance and friction for the square dependence of both moments on the angular velocity of the rotor. The possible relationships between the coefficients are discussed in detail, and rotor-motion equations of the most characteristic relationships are integrated. The method is based on experiments carried out during coasting under atmospheric conditions as well as in vacuum. The article was recommended by the Kafedra teoreticheskoy mekhaniki (Chair of Theoretical Mechanics). There are 2 Soviet references.

S/146/60/003/01/009/016
D002/D006

On the Determination of Aerodynamic Resistance and Friction in the Axle Supports of a Gyromotor by the Coasting Method Using a Vacuum

ASSOCIATION: Leningradskiy institut aviatsionnogo priborostroyeniya (Leningrad Institute of Aviation Instrument Building)

SUBMITTED: September 29, 1959

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APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205120007-4"

87870

S/146/60/003/006/006/013
B012/B060

13.2520

AUTHOR: Bessonov, A. G.

TITLE: Dynamic Axial Displacement of the Center of Gravity of the Gyroscope Rotor and Methods of Its Elimination

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborostroyeniye, 1960, Vol. 3, No. 6, pp. 50 - 61

TEXT: The results supplied by A. Yu. Ishlinskiy's (Ref.1) and G. S. Santuryan's (Ref.2) papers are better defined and further developed here. The author studied the axial displacement of the center of gravity of the rotor in the deformation of the gyroscope rotor under the action of centrifugal forces. As in the two mentioned papers it is also assumed here that the external forces are negligibly small compared with the centrifugal forces, and secondly, that the theory of thin-walled shells is applicable. On the basis of the latter both the radial and axial deformation are taken into account here. Also the effect of the rotor axis is taken into account, and a more precise form of ground deformation, as compared with papers (Refs. 1, 2) is obtained. Formula (42)

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Dynamic Axial Displacement of the Center of Gravity of the Gyroscope Rotor and Methods of Its Elimination S/146/60/003/006/006/013 B012/B060

$$\Delta z_c' = \frac{\beta C_2 (R-\rho)}{2}\left[1 - \frac{R h_1}{2(Rh_1 + 2hl)}\right] + \frac{2h(A_1C_1 + A_2C_2 + A_3C_3 + A_4C_4 + A_5)}{\beta^2 R (Rh_1 + 2hl)}. \quad (42)$$

is derived. It gives the axial displacement of the center of gravity in the case of a cup-shaped rotor. A series of calculations made with this formula shows that the latter is fairly well usable in the practice. h is the thickness of the cylindrical shell, R is the radius of the middle plane, σ - is Poisson's number, C_i are arbitrary constants, $K_i(x)$ are A. N. Krylov's functions, β is given by formula (4)

$$\beta = \sqrt[4]{\frac{3(1-\sigma^2)}{R^2H^2}} \quad (4)$$

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87870

Dynamic Axial Displacement of the Center of Gravity of the Gyroscope Rotor and Methods of Its Elimination

S/146/60/003/006/006/013
B012/B060

ρ is the radius of the rotor axis, l is the maximum flexure. It is shown that if a cup-shaped rotor has been used, it is to undergo a prior displacement of the rotor center of mass in the inverse direction along the z-axis. This displacement should correspond to Δz_c in normal operation. Then, with normal operation of the gyroscope, the rotor center of mass will coincide with the center of the Cardanic suspension. A complete elimination of the rotor center of mass shift for all modes of operation can be attained only with rotors having an equatorial symmetry plane. Mention is made of papers by A. I. Lur'ye (Ref.3) and P. F. Papkovich (Ref.5) as well as the tables of the functions by Freyd-Puzyrevskiy. The publication of this article was recommended by the kafedra teoreticheskoy mekhaniki (Department of Theoretical Mechanics). There are 6 figures, 2 tables, and 5 Soviet references.

ASSOCIATION: Leningradskiy institut aviatsionnogo priborostroyeniya (Leningrad Institute of Aviation Instruments)

SUBMITTED: March 16, 1960

Card 3/3

Rekomendovana teoreticheskoy mekhaniki

20043

S/146/61/004/001/007/016
B104/B215

13.2520

AUTHOR: Bessonov, A. G.

TITLE: Effect of gaps between rotor and gyrochamber on the aerodynamic resistance of a gyromotor

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborostroyeniye, v. 4, no. 1, 1961, 58-67

TEXT: It is the first purpose of the present paper to find a mathematical term for expressing the dependence of the moment M_a of the aerodynamic resistance of the rotor rotation in the gyrochamber on the gap δ between rotor and gyrochamber. Second purpose is to find an optimum gap δ_{opt} by the function $M_a = f(\delta)$ with M_a being a minimum. For the derivation of the function $M_a = f(\delta)$ the author assumed that the power necessary for overcoming the aerodynamic resistance, can be expressed by the relation $U = M_a \Omega$ (1). The author then derives U as

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a function of δ. He uses the relation $dU_z = 2\pi R H \nu \rho \frac{dv}{dh} dv$ (2) which represents the elementary power consumed by the elementary cylindrical layer of the gap. After comprehensive calculations, the author obtains the following relation: $U(\delta) = R^3 \left(H + \frac{R}{2}\right) \Omega^2 \rho \left(\frac{Ak\delta}{3} + 2\nu B \frac{1}{\delta}\right)$ (24), from which he obtains $M_a = \pi R^3 \left(H + \frac{R}{2}\right) \Omega \rho \left(\frac{Ak}{3}\delta + 2\nu B \frac{1}{\delta}\right)$ (25) where R is the radius of the cylindrical part of the rotor, H the width of this part, U the kinematic viscosity coefficient, dv the difference in the velocities of the elementary layers, and ρ the air density. If no air exchange takes place between gyrochamber and the surrounding medium (k = 0), formula (25) takes on the following form: $M_c = 2\pi R^2 \left(H + \frac{R}{2}\right) \nu \rho B \frac{\Omega R}{\delta}$ (26). The dimensionless coefficient B is shown to give the ratio between velocity gradient in the boundary layer of the rotor, and the mean velocity gradient in the gap. The experimental values of B ranging from 10 to 30 are dependent on the gap.

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B104/B215

Effect of gaps between rotor and ...

The values of A are approximately unit. Since the experimental determination of A and B is difficult, the author recommends a previously derived formula for the determination of M_a:

$M_a = 2\pi R^2 H_p \nu \rho (dv/dh)_p$ (27). The distribution of the velocity in the gap of the АП-5 (AP-5) autopilot was measured by a water manometer. A and B were calculated according to these results. Fig. 2 gives a graphical representation of the values of M_a (M_a g.cm, δ in mm) calculated by (25), i.e. by taking into account an air exchange between gyrochamber and the surrounding medium ($k \neq 0$) and also by (26) ($k = 0$). It can be seen that δ_{opt} is the same for $k = 0$ and $k \neq 0$. The publication of this article was recommended by the Kafedra teoreticheskoy mekhaniki (Department of Theoretical Mechanics). There are 2 figures, 1 table, and 2 Soviet-bloc references.

ASSOCIATION: Leningradskiy institut aviatsonnogo priborostroyeniya (Leningrad Institute of Aviation Instruments)

25556
S/146/61/004/002/009/011
B124/B206

Displacement of the...

sistem (Mechanics of special gyroscopic systems), Izd. AN UkrSSR, 1952), G. S. Santuryan (Ref. 2: Ukhody giroskopa, obuslovlennyye deformatsiyey rotora, imeyushchego formu stakana (Deflections of a gyroscope, caused by deformation of the cupped rotor, L., 1959), and the author (Ref. 3: Dinamicheskoye osevoye smeshcheniye tsentra tyazhesti rotora i sposoby yego ustraneniya (Dynamic axial displacement of the center of gravity of the rotor and procedure for its elimination), "Izvestiya vysshikh uchebnykh zavedeniy SSSR, "Priborostroyeniye", 1960, No. 6). In these studies the theory of thin-walled envelopes is applied, which gives enough accurate results for the total deformation. It was shown that the cylindrical part of the rotor deforms owing to the effect of centrifugal forces in such a way that its radial displacement w is given by the equation

$$D \cdot w_z^{IV} + (Fh/R^2)w = (\gamma/g)hR\Omega^2 \quad (1).$$

The axis Oz is oriented toward the rotor axis (Fig. 1). In Eq. (1) w denotes the displacement of the points of the central cylinder surface in radial direction perpendicular to Oz, and D the cylindrical rigidity

$$D = Eh^3/12 \cdot (1 - \sigma^2) \quad (2),$$

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where E is Young's modulus, h the thickness of the cylindrical rotor part, R the radius of the central cylinder surface of the rotor, γ the specific gravity of the material, Ω the angular velocity of the rotation of the rotor around its axis and σ Poisson's coefficient. A general solution of Eq. (1) is represented by the equation

$$w_1 = \sum_{i=1}^{4} C_i \cdot K_i(z) + w_2 \quad (3),$$

where C_i represents arbitrary integration constants to be determined, K_i the functions by A. N. Krylov, which are mentioned in Refs. 2 and 3, and w_2 gives the special solution of Eq. (1), for which the correlation

$$w_2 = \gamma \Omega^2 R^3 / gE \quad (4)$$

holds. For the displacement w_3 of the points of the central cylinder surface in radial direction under the effect of the temperature field alone,

$$w_3 = R\alpha t \cdot p(z) \quad (5)$$

holds, where α is the temperature expansion coefficient. For the total displacement w of the points of the central cylinder surface under effect

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of centrifugal forces as well as the temperature field, expressed as the sum of the corresponding displacements,

$$w = w_1 + w_3 = \sum_{i=1}^{4} C_i \cdot K_i + w_2 + R\alpha t \cdot p(z) \quad (6).$$

For the required displacement of the center of gravity Δz_c

$$\Delta z_c = \frac{\beta}{2}(R-\rho)\cdot[C_2 + R\alpha t\cdot p'_x(0)]\cdot\left[1 - \frac{h_1(R^2+\rho^2)}{2R(Rh_1+2hl)}\right] - \frac{2h(R\cdot N_1 + N_2)}{R(Rh_1+2hl)}. \quad (63)$$

is derived, which changes into form

$$\Delta z_c = \frac{\beta}{2}(R-\rho)\cdot[C_2 + R\alpha t\cdot p'_x(0)]\cdot\left[\frac{h_1(R^2+\rho^2)}{2R(Rh_1+2hl)}\right] - \frac{2h}{R(Rh_1+2hl)\cdot\beta^2}\cdot\left\{w_2\cdot\beta l\left(1-\sigma-\frac{\beta l}{2}\right) + R\alpha t\cdot\left[(1-\sigma)\int_0^{\beta l}dx\int_0^x p(x)\,dx + \int_0^{\beta l} x\cdot p(x)\,dx\right] + A_1\cdot C_1 + A_2\cdot C_2 + A_3\cdot C_3 + A_4\cdot C_4\right\}, \quad (64)$$

for the purpose of simplified comparison of the center-of-gravity displacement with and without temperature field, A_i being determined from equations

$$A_1 = \beta l \cdot K_2 - (1+\sigma) \cdot K_3; \quad A_3 = K_4 + \frac{1+\sigma}{4}(K_1 - 1);$$

$$A_2 = K_3 - (1-\sigma) \cdot K_4; \quad A_4 = \frac{1+\sigma}{4} \cdot K_2 - \frac{K_1 + 1 + \sigma\beta l}{4}; \qquad (65)$$

and the values of K_i taken for $x = \beta l$. Eqs. (65) obtained for the determination of A_i, $i = 1 \dots, 4$. are the same as in Ref. 3. The established displacement of the center of gravity of the rotor can also be obtained by heating the rotor shaft. The values for the displacement Δz_c of the center of gravity of the rotor with the parameters $R = 4.5$ cm, $h = 1.2$ cm, $h_1 = 0.4$ cm, $l = 3.0$ cm, $\sigma = 0.3$, $\gamma = 7.8$ g/cm^3, $\Omega = 3000$ sec^{-1}, $E = 2.1 \cdot 10^6$ kg/cm^2 are given finally in Table 1. The experimental results for Δz_c agree with those calculated from Eq. (64) and results from previous studies. The data mentioned in Table 1 characterize the displacement of the center of gravity of the rotor owing to the effect of the rotor deformation itself; they cannot be used for the direct determination of the gyroscope errors. The

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Displacement of the... S/146/61/004/002/009/011
B124/B206

deformation of the gyro chamber and the bearings would have to be considered additionally. A. I. Lur'ye (Ref. 4: Statika tonkostennykh uprugikh obolochek (Statics of thin-walled elastic envelopes), Gostekhizdat, 1947) is mentioned. This study has been recommended by the Department of Theoretical Mechanics. There are 2 figures, 1 table, and 4 Soviet-bloc references.

ASSOCIATION: Leningradskiy institut aviatsionnogo priborostroyeniya (Leningrad Institute of Aviation Instruments)

SUBMITTED: June 27, 1960

Card 6/7

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205120007-4"

28958
S/146/61/004/003/007/013
D217/D301

13.2520

AUTHOR: Bessonov, A.G.

TITLE: The comparative advantages of some gas media in gyromotor chambers

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborostroyeniye, v. 4, no. 3, 1961, 68 - 74

TEXT: The gyrochamber is either evacuated or filled with gas, in which case it must provide maximum cooling and not introduce complications into the chamber. It is necessary to find an optimum medium. The momentum of aerodynamic resistance

$$M_a = \pi \varkappa c_\tau \rho R^5 \Omega^2 \qquad (1)$$

where R - rotor radius, c_τ - coefficient of aerodynamic resistance per unit of rotor surface, ρ - medium density, Ω - angular velocity, $\varkappa$ - form factor. As M_a is proportional to ρ, the filler must

Card 1/5 4

be of the lowest density possible. c_τ depends on R_e and M numbers. For the analysis graphs $c_\tau = c_\tau(R_e)$ and $c_\tau = c_\tau(M)$ where M is taken from an article by I.L. Povkh (Ref. 3: Aerodinamicheskiy eksperiment v mashinostroyenii, Mashgiz, 1959). From

$$Re = \frac{\Omega R^2}{\nu} \quad (3)$$

where ν - coefficient of kinematic viscosity, and the graph (Fig. 1) the gas with the lowest ν must be chosen. From

$$M = \frac{v}{v_{3B}} \quad (4)$$

and the graph (Fig. 2) the gas with the highest speed of sound must be chosen. Data are given in tabulated form for gas fillers at t = 0°C and p = 760 mm of Hg. For low ρ the best gases are H and H_e, The lowest viscosity is exhibited by ammonia and methane At $R_e > 10^6$ the reduction Re 7 - 8 times hardly affects c_τ. For

28958

The comparative advantages of ... S/146/61/004/003/007/013
D217/D301

In air filled gyro with $R_e \simeq 10^4$ exchange of air for H or H_e may increase c_τ 6 - 8 times. The reduction of aerodynamic resistance by changing from air to H, 14 fold, air to H_e 7 fold, may be obtained for high speed gyros, for which $R_e > 10^6$. Ammonia and methane, if used at all, may be used for low speed gyros. It is shown that all gases are better than air. A comparison of Ma for air with other gases is also given. From the view point of minimum Ma the best gases are H and H_e, even at normal pressure. Reduced pressure produces reduced Ma but as this may increase the weight and deform the chamber it is not always recommended. It is produced a) in the stator and rotor of the gyro, b) in the bearing of the main rotor axis, and c) in the gas medium. Heat in (a) cannot be reduced; heat in the bearing can be reduced by appropriate construction; heat in (c) can be removed by convection, conduction and radiation. It may generally be said that heat dissipation will be improved if a gas with a large specific heat Cp and large thermal conductivity

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28958

The comparative advantages of ... S/146/61/004/003/007/013
D217/D301

is used. The most advantageous is H, and then H_e. In conclusion, a vacuum does not give great advantages compared with H or H_e. There are 3 tables, 2 figures and 5 Soviet-bloc references.

ASSOCIATION: Leningradskiy institut aviatsionnogo priborostroyeniya (Leningrad Institute of Aviation Instrument Construction)

SUBMITTED: October 12, 1960

Card 4/5

APPROVED FOR RELEASE: 06/08/2000 CIA-RDP86-00513R000205120007-4"

29605

S/146/61/004/004/009/015
D201/D306

13.2520

AUTHOR: Bessonov, A. G.

TITLE: On computing the aerodynamical resistance of a gyro-motor

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborostroyeniye, v. 4, no. 4, 1961, 61 - 70

TEXT: In designing a gyroscope system it is necessary to know the moment M_a of the motor and its aerodynamic resistance together with the coefficient C_m of the moment M_a and coefficient C_τ of the resistance of the elementary area dS of the rotor surface. The author derives a more accurate expression for M_a. The formula reflects the interdependence between the geometrical dimensions of the rotor, the width δ of the gaps between the opposite faces of the motor and the body of the gyro, the angular frequency of revolution Ω of the rotor and its max. radius R, the division of surfaces of the rotor into "disc" and "cylindrical" domains and the properties of the gas filling the gyro chamber. The formula is derived for a par-

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X

ticular shape of the gyromotor. The motor is taken as having an equatorial plane of symmetry. For such a motor the expression for the total aerodynamic resistance of the motor discs M_{ad} is derived as

$$M_{ad} = 1.25\alpha \cdot \left\{ \left(\frac{\delta_{ex}}{R}\right)^{-0.2} + \left(\frac{r_1}{R}\right)^{4.8} \cdot \left[\left(\frac{\delta_{in}}{R}\right)^{-0.2} \right] \right\} \cdot Re^{-0.2} \cdot \rho \cdot \omega^2 \cdot R^5 \quad (17)$$

where Re is the Reynold's number, $\alpha = 0.011$; δ_{ex} and δ_{in} gaps. Formula (17) permits evaluation of the part of the total moment M_a of the aerodynamic gyromotor resistance due to the disc parts of the rotor. To find the total value of M_a - the component M_{a1} of the moment must be determined which represents the resistance due to cylindrical surfaces of the rotor. It is pointed out that the expression for M_a does not include the effect of the resistance, due to the inner cylindrical surfaces of the rotor and cannot, therefore, be used. The expression for this total moment

$$M_a = 1.25 \cdot \alpha \cdot Re^{-0.2} \cdot \left\{ \left(\frac{\delta_{ex}}{R}\right)^{0.2} . \left[\left(\frac{\delta_{in}}{R}\right)^{0.2} \quad \left(\frac{\delta_{ex}}{R}\right)^{0.2} \right.\right.$$

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$$\cdot\left(\frac{r_1}{R}\right)^{4.8} - [illegible].4\cdot\frac{H}{R}\left[\left(\frac{\delta_{cyl}}{R}\right)^{-0.2} + k\cdot\left(\frac{r_1}{R}\right)^{3.8}\cdot\left(\frac{\delta_c}{R}\right)^{-0.2}\right]\Big\} \cdot$$

$$\rho\cdot\Omega^2 R^5 \qquad (31)$$

is derived which is the required solution of the problem. It must be remembered that the ratios (δ/R) should not exceed 0.05 - 0.10. More exactly, if $(\delta/R)_{opt}$ is the value of the gap corresponding to the minimum aerodynamical resistance, then the derived formulae are valid for $\delta/R \leqslant (\delta/R)_{opt}$ and for larger values of δ/R would produce erroneous results. It is stated that the present work does not solve the problem of the optimum value of gas (δ/R) and of the minimum aerodynamic resistance $M_{a\ min}$. This article was recommended by the Kafedra teoreticheskoy mekhaniki (Department of Theoretical Mechanics). There are 2 figures and 5 Soviet-bloc references.

ASSOCIATION: Leningradskiy institut aviatsionnogo prioborostroyeniya (Leningrad Institute of Aviation Instrument Construction)

SUBMITTED: October 14, 1960

Card 3/3

39063

S/146/62/005/003/011/014
D234/D308

13,2520

AUTHOR: Bessonov, A.G.

TITLE: Vacuum in the gyroscopic chamber and the problem of aerodynamical resistance of gyroscope motor

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborostroyeniye, v. 5, no. 3, 1962, 91-98

TEXT: The purpose of the paper is to prove that the introduction of vacuum in the gyroscopic chamber does not solve the problem of aerodynamical resistance, and to find the most suitable way of solving it. The author finds from the formula of mean free path of the molecules the pressure at which the aerodynamical resistance practically disappears. It is concluded that vacuum leads to an increase of inhomogeneity of temperature fields, which causes deformations of all parts of the motor; the chamber housing must be made stronger for maintaining the vacuum, which increases the weight of the chamber and its moments of inertia, and therefore decreases the accuracy of the instrument. The author discusses 5 possible improve-

Card 1/2

Vacuum in the gyroscopic chamber ... S/146/62/005/003/011/014
D234/D308

ments suggested by him in previous publications and concludes that an appropriate solution is to fill the chamber with H or He at half the atmospheric pressure and to provide for a rational shape of the rotor, optimal gaps between the rotor and the chamber and adequate finishing of the rotor surface. There are 2 figures and 1 table.

ASSOCIATION: Leningradskiy institut aviatsionnogo priborostroyeniya (Leningrad Institute of Aircraft Instrument Construction)

SUBMITTED: December 25, 1961

Card 2/2

39341
S/146/62/005/004/010/013
D295/D308

13,2520

AUTHOR: Bessonov, A.G.

TITLE: Determining the optimum clearance between gyro-chamber and rotor and the optimum smoothness of their surfaces

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Priborostroyeniye, v. 5, no. 4, 1962, 63-70

TEXT: The optimum clearance δ_{opt}, between rotor and gyro-chamber of given geometry is defined as the value that minimizes, for a given gaseous medium, the aerodynamic resistance of the gyro-motor. As theoretical formulae give contradicting figures, an experimental approach to its determination is suggested, on the assumption that a prototype gyro-motor is available having maximum achievable smoothness of the rotor surface. For values of δ of the order of δ_{opt}, the aerodynamic resistance torque, M_a, is considered to be a function of δ of the type $M_a = A^{-1} + B\delta + C$. Three measurements of M_a will suffice to determine A, B and C and hence

Card 1/2

L 10750-67 EWT(d)/FSS-2/EWT(l)/EWT(m)/EEC(k)-2/EWP(c) IJP(c) JD

ACC NR: AR6016445 (N) SOURCE CODE: UR/0124/65/000/012/A007/A008

38

AUTHOR: Bessonov, A. G.

TITLE: Relationship between the acceleration parameters of a rotor for the case of pulsed gyroscope starting

SOURCE: Ref. zh. Mekhanika, Abs, 12A60

REF SOURCE: Tr. Leningr. in-t aviats. priborostr., vyp. 44, 1964, 105-110

TOPIC TAGS: gyroscope system, motion mechanics

ABSTRACT: The author formulates, solves and analyzes differential equations for acceleration of the rotor in a pulsed gyroscope. Consideration is given to the reactive moment, aerodynamic drag and friction in the bearings caused by dynamic reactions from imbalance, as well as variability in the axial moment of inertia of the rotor in the general case. A rather simple interaction is established between the basic acceleration parameters. Summary. [Translation of abstract]

SUB CODE: 17

Card 1/1

L 42474-65 EEO-2/EWT(d)/FSS-2/EWT(1)/EWP(m)/EEC(k)-2/EWG(v)/EED-2/FCS(k)/EWA(c)
Pn-4/Po-4/Pd-1/Pe-5/Pq-4/Pg-4/Pk-4/Pl-4 EC

ACCESSION NR: AP5006643 S/0146/65/008/001/0113/0121

AUTHOR: Bessonov, A. G.

TITLE: Fundamental interrelations between the design and aerodynamics of spin motors

SOURCE: IVUZ. Priborostroyeniye, v. 8, no. 1, 1965, 113-121

TOPIC TAGS: gyro, spin motor, aerodynamics

ABSTRACT: Three tables showing the interrelations between aerodynamic-resistance factors, spin-motor operating conditions, its application, its manufacture, etc., are presented. The aerodynamic resistance depends on the rotor angular velocity, rotor shape and size, gaps, gas medium, drainage, and rotor surface machining. The spin-motor characteristics connected with its aerodynamic resistance are: required gyro accuracy, time of operation (frequency of use), power consumption, external medium characteristics, pressure,

Card 1/2

L 42474-65
ACCESSION NR: AP5006643

manufacturing facilities, economic requirements. Possible designs include these factors: rotor shape (equatorially symmetrical, asymmetrical); gyro chamber (sealed, drained); gas medium in the housing; gaps between the rotor, housing, and stator; screws, balancing countersinks, nozzles; internal baffle plates. The above three tables and auxiliary curves facilitate designing spin motors for minimal aerodynamic resistance and comparing the variants. Orig. art. has: 2 figures and 3 tables.

ASSOCIATION: Leningradskiy institut aviatsionnogo priborostroyeniya (Leningrad Institute of Aviation Instruments)

SUBMITTED: 15Dec63 ENCL: 00 SUB CODE: NG

NO REF SOV: 006 OTHER: 000

Card 2/2

L 04444-67 EWT(d)/FSS-2/EWT(1)/EWP(m)/EWT(m)/EEC(k)-2 JD

ACC NR: AP6022061 SOURCE CODE: UR/0146/66/009/003/0093/0099

AUTHOR: Bessonov, A. G.

ORG: Leningrad Institute of Aviation Instrument Construction (Leningradskiy institut aviatsionnogo priborostroyeniya)

66

B

TITLE: Methods of approximate calculation of aerodynamic losses in a gyromotor

SOURCE: IVUZ. Priborostroyeniye, v. 9, no. 3, 1966, 93-99

TOPIC TAGS: approximation calculation, gyroscope, aerodynamic drag moment, rotor

ABSTRACT: The aerodynamic drag of a cylindrical rotor is determined by the additive method, proceeding from the fundamental formula for the drag coefficient of cylindrical and disk-shaped surfaces. The dimensionless factor appearing in the expression for the coefficient of the moment of aerodynamic drag of a real rotor is determined for the following cases: 1) taking into account the rotor-stator unit, a) for the laminar-with-vortex regime b) for turbulent flowpast; 2) taking into account the tapering-off of a real rotor; 3) taking into account the increase in aerodynamic drag due to the presence on the initially smooth surface of various imperfections (bolt sockets and heads, balancing countersinks, etc.); 4) taking into account drainage of the gyrochamber by the surrounding gas medium; 5) taking into account increased moment of resistance due to acceleration of the rotor by impulses deviating from the flow rate.

Card 1/2 UDC: 531.781

L 04444-67

ACC NR: AP6022061

It is concluded that these individual factors may be expressed with an accuracy on the order of 10–15%, especially with regard to case 4 and perhaps case 3. On an average the accuracy of final results is completely satisfactory and the calculation time required is extremely short. Orig. art. has: 17 formulas, 3 figures, and 1 table.

SUB CODE: 17, 20/ SUBM DATE: 21Apr65/ ORIG REF: 006/ OTH REF: 002

Card 2/2

ARTOBOLEVSKIY, I.I., akademik, doktor tekhn. nauk, red.; LEVITSKIY, N.I., doktor tekhn. nauk, prof., red.; KOZHEVNIKOV, S.N., red.; KOBRINSKIY, A.Ye., doktor tekhn. nauk, red.; PETROKAS, L.V., doktor tekhn. nauk, prof., red.; GAVRILENKO, V.A., doktor tekhn. nauk, prof., red.; BESSONOV, A.I., kand. tekhn. nauk, red.; SHEKHVITS, E.I., kand. tekhn. nauk, red.

[Theory of automatic machines and of hydraulic and pneumatic drives] Teoriia mashin-avtomatov i gidro-pnevmoprivoda; sbornik statei. Moskva, Mashgiz, 1963. 327 p. (Its: Trudy)
(MIRA 17:10)

1. Soveshchaniye po osnovnym problemam teorii mashin i mekhanizmov. 3d, Moscow, 1961. 2. Chlen-korrespondent AN UkrSSR (for Kozhevnikov).

EWP(i)/EWP(b)/T/EWA(1)/EWP(e) Pc-4/Pr-4/Ps-4/Pt-7/Pu-4/Pab-10/Peb WW/ GG/RM/WH

ACCESSION NR: AP5012099 UR/0191/65/000/005/0003/0004

AUTHOR: Bessonov, A. I.; Vitushkin, N. I.; Glazunov, P. Ya.; Karapetyan, Sh. A.; Parfanovich, B. N.; Ryabchikova, G. G.; Yakubovich, A. A.

TITLE: Unit for gas-phase radiation-induced graft polymerization

SOURCE: Plasticheskiye massy, no. 5, 1965, 3-4

TOPIC TAGS: graft polymerization, gas phase graft polymerization, radiation induced graft polymerization

ABSTRACT: A pilot-plant unit has been built for producing various graft polymerization products (combining the advantages of the constituents) by the technique of gas-phase radiation-induced graft polymerization in quantities sufficient for technical testing. The unit is suitable for grafting polymer molecules to the surface of mineral powders and synthetic and mineral fibers, fabrics, and films by irradiating them with fast electrons in an atmosphere of gaseous monomer and inert gas. The unit is designed to operate either 1) with monomers whose boiling point is above room temperature (Fig. 1 of the Enclosure) or 2) with monomers which are normally gaseous. In the

L 44135-65

ACCESSION NR: AP5012099

4

first case, to prevent monomer vapor condenstion in the reactor and the pipe, the liquid monomer temperature in the feed tank is always maintained 30—50C below the working gas temperature. In the second case, the gaseous monomer is fed directly from a pressure cylinder. Two reactor types are available: one specifically designed for fibers films, and fabrics, and the other, for powders. The experimental results shown in Table 1 of the Enclosure were in good agreement with results obtained in glass ampuls, indicating the feasibility and expediency of the scale-up of this process to full-scale plant equipment. "The authors express their appreciation to B. L. Tsetlin for participating in the discussion of the project and for valuable advice during startup, and to N. V. Mikhaylov, L. G. Tokareva, and Ye. V. Yegorov for valuable advice on design problems. Orig. art. has: 1 figure and 1 table.' [SM]

ASSOCIATION: none

SUBMITTED: 00 ENCL: 02 SUB CODE: OC, GC

NO REF SOV: 005 OTHER: 000 ATD PRESS: 3246

Card 2/4

[redacted]; GEL'BUKH, L.A.; YELISTRATOV, I.F.; SMIRNOV, V.A.; TARSKIY, Yu.S., kapitan 2 ranga, red.; CHAPAYEVA, R.I., tekhn. red.

[Underwater search] Podvodnyi poisk. Moskva, Voenizdat, 1963. 93 p. (MIRA 16:10)
(Diving, Submarine) (Underwater television)
(Underwater acoustics)

USSR/Engineering - Soil Mechanics

FD-1458

Card 1/1 : Pub. 41-12/17

Author : Artobolevskiy, I. I. Bessonov, A. P., and Rayevskiy, N. P., Moscow

Title : Dynamic curves of soil pressure on a pile driven by the vibration method

Periodical : Izv. AN SSSR. Otd. tekh. nauk 7, 116-121, July '54

Abstract : Describes apparatus used and gives results obtained in an experimental investigation of the effective pressure of soil on a pile under conditions of vibration pile-driving. Obtains curve of soil pressure on the butt of a pipe and a curve of the displacement of the pipe during process of vibration pile-driving as a function of time. Oscillogram; diagrams; graphs. Seven references.

Institution :

Submitted : September 3, 1954

124-1957-1-161

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 1, p 17 (USSR)

AUTHORS: Bessonov, A. P., Dubrovskiy, V. A.

TITLE: On A. I. Taynov's Paper "Kinematics of the Assur Groups of the Second Class, Second Type" (O stat'e A. I. Taynova "Kinematika grupp Assura vtorogo klassa vtorogo tipa")

PERIODICAL: Izv. AN BSSR, 1955, Nr 2, pp 143-146

ABSTRACT: Instead of applying the well-known method of geometric loci to a kinematic investigation of the Assur groups of the fourth class, A. I. Taynov (RZhMekh, 1955, 47) attempted the development of a simpler and more direct method of investigation. The Authors have shown that A. I. Taynov's methods appears erroneous in principle and, therefore, that it cannot be used.

I. I. Artobolevskiy

1. Mathematics--Critic

Bessonov, A. P.] kandidat tekhnicheskikh nauk;

Card 1/1

ARTOBOLEVSKIY, I.I., akademik; BESSONOV, A.P., kandidat tekhnicheskikh nauk; SHLYAKHTIN, A.V., kandidat tekhnicheskikh nauk; MITIN, V.I., redaktor; REBINDER, P.A., akademik, redaktor; PAVLOVSKIY, A.A., tekhnicheskiy redaktor

[Vibrating machines] O mashinakh vibratsionnogo deistviia. Moskva, Izd-vo Akademii nauk SSSR, 1956. 45 p. (MIRA 9:3)
(Vibration--Industrial application)

Bessonov, A.P.

25(2) PHASE I BOOK EXPLOITATION SOV/2564

Akademiya nauk SSSR. Institut mashinovedeniya. Seminar po teorii mashin i mekhanizmov

Trudy, tom 18, vyp. 69 (Transactions of the Institute of Mechanical Engineering, Academy of Sciences, USSR. Seminar on the Theory of Machinery and Mechanisms, Vol 18, No. 69) Moscow, Izd-vo AN SSSR, 1958. 69 p. Errata slip inserted. 2,500 copies printed.

Ed. of Publishing House: V.R. Beylin; Tech. Ed.: N.F. Yegorova; Editorial Board: I.I. Artobolevskiy, Academician (Resp. Ed.); G.G. Baranov, Doctor of Technical Sciences, Professor; V.A. Gavrilenko, Doctor of Technical Sciences, Professor; V.A. Zinov'yev, Doctor of Technical Sciences, Professor; A.G. Kobrinskiy, Doctor of Technical Sciences; N.I. Levitskiy, Doctor of Technical Sciences, Professor; N. P. Rayevskiy, Candidate of Technical Sciences; L.N. Reshetov, Doctor of Technical Sciences, Professor; and M.A. Skuridin, Doctor of Technical Sciences, Professor.

Card 1/4

Transactions of the Institute (Cont.) SOV/2564

PURPOSE: This book is intended for engineers interested in the theory of machinery and mechanisms.

COVERAGE: This collection of scientific papers deals with the synthesis and analysis of types of linkage, an investigation of vibratory mechanisms, and methods of calculating the nonuniformity of tape movement in tape-feeding mechanisms of memory units. References follow several of the articles.

TABLE OF CONTENTS:

The author discusses the theory of a new universal "konikograf" (a device for drawing conic sections), the application of the inversion principle in the construction of a straight-line mechanism, and the theory of exact-translation mechanisms.

Card 2/4

Gazarov, A.T. [Candidate of Technical Sciences]. Problem of Synthesizing Four-bar Linkages With Maximum Angles of Transmission

The author discusses the problem of designing a four-bar linkage with a given velocity ratio and a maximum angle of transmission. 13

Levitskiy, N.I. [Doctor of Technical Sciences]. Synthesis of Link Mechanisms

The author presents a simplified and accurate method of synthesizing types of linkages. 18

Bessonov, A.P. [Candidate of Technical Sciences]. Investigating the Motion of a Vibratory Mechanism With a Weak Spring as a System With Two Degrees of Freedom

The author investigates the motion of a vibratory mechanism with a small restoring force. 34

Transactions of the Institute (Cont.) SOV/2564

Pusset, L.A. [Candidate of Technical Sciences]. Methods of Calculating the Nonuniformity of Tape Movement in Tape-feeding Mechanisms 52

AVAILABLE: Library of Congress

Card 4/4

GO/mg
12-7-59

SOV/ 30-58-6-33/45

AUTHORS: Artobolevskiy, I. I., Member, Academy of Sciences, USSR,
Bessonov, A. P., Candidate of Technical Sciences,
Khrushchov, M. M., Doctor of Technical Sciences,
Pruzhanskiy, L. Yu.

TITLE: The Development of Machine Science (Razvitiye nauki o mashinakh)

PERIODICAL: Vestnik Akademii nauk SSSR, 1958, Nr 6, pp. 118-122 (USSR)

ABSTRACT: At the Institute of Machine Science of the AS USSR, the second All Union Conference on essential problems of the theory of machines and mechanisms took place from March 24 - 28. The task of this conference was the discussion of concrete results obtained by Soviet and foreign scientists in this field in the course of recent years, as well as to determine the main directions of the further development of this science. Besides Soviet scientists from various towns of the USSR, also scientists of the other peoples' republics took part. More than 80 reports and communications were heard. The first plenary meeting was opened by I. P. Bardin, Member, Academy

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of Sciences. In his report A. A. Blagonravov dealt with the importance of machine science for solving the problems in the automatization of production processes. I. I. Artobolevskiy, Member, Academy of Sciences, gave a survey of the present stage of the machine and mechanism theory. N. G. Bruyevich, Member, Academy of Sciences, reported on the main trends in the development of the science of the accuracy in machine- and apparatus-building. V. Likhtenkhel'dt characterized in short the stage of development of the theory of mechanisms in the German Democratic Republic, D. Manzheron reported on the works of Rumanian scientists in this field. I.Shreyter (Czechoslovakia), Ya. Oderfel'd (Poland) and G. Kalitsin (Bulgaria) delivered short welcoming addresses. The work of the conference was carried out in 5 sections: analysis and synthesis of mechanisms; machine dynamics; theory of accuracy in machine and apparatus building; theory of automatic machines; theory of machine drives. Reports dealing with the preset control of metalworking machines met with great interest. At the end of the conference it was found that the research carried out is closely connected with the problem of automatization. It was

The Development of Machine Science SOV/ 30-58-6-33/45

noticed, too, that not all trends in machine theory show a uniform development. The most important problems for the future were outlined. Urgent problems concerning the method of teaching mashine theory as a subject were discussed with the representatives of the Chairs of Universities.

The third All Union Conference on friction and wear in machines was organized by the Institute for Machine Science of the AS USSR in Moscow, and was held from April 9 - 15. It was attended by representatives of the ministries, the councils of national economy, the scientific research institutes, the universities and industrial enterprises of various cities of the USSR, as well as by the foreign scientists F. Dukati and E. Lekhner (Hungary), V. N. Konstantinesku and N. Tipey (Romania) and I. Sgon (Czechoslovakia). The conference was opened by A. A. Blagonravov, Member, Academy of Sciences. Further reports were delivered by:

1) Ye. M. Gut'yar on the present trends in the development of the theory on hydrodynamic lubrication.

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SOV/30-58-6-33/45

The Development of Machine Science

2) G. V. Vinogradov on some new problems in the field of lubrication and lubricating materials.

3) B. V. Deryagin on modern lubrication problems.

4) I. V. Kragel'skiy on the development of the sciences of dry friction.

5) M. M. Khrushchov on modern trends in the development of the science of wear and resistance to wear.

The work of the conference took place in 5 sections: hydrodynamic theory on lubrication and sliding surfaces; lubrication and lubricating materials; dry friction and limit friction; wear and resistance to wear; friction and antifriction materials. The conference expressed the wish that a national committee on friction and wear in machines be formed. The necessity of working out a terminology in the field of friction and wear was stressed. At the Universities for Machine Building a course of lectures on friction, wear and lubrication of machines is to be introduced. It was also suggested to establish branches of the seminary, of the Institute of Machine Science dealing with this field

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SOV/30-58-6-33/45

The Development of Machine Science

at other centers.

ASSOCIATION: Institut mashinovedeniya
(Institute of Machine Engineering)

1. Machines--Theory 2. Machines--Design

Card 5/5

BESSONOV, A.P.

Investigating the motion of a vibrating mechanism with a weak spring as a system with two degrees of freedom. Trudy Inst.mash.Sem.po teor.mash. 18 no.69:34-51 '58.
(MIRA 12:5)

(Mechanical movements)
(Vibrators)