

KRYMSKIY, L.D. (Moskva, B-140, Krasnoprudnaya ul., d.30/34, kv.111)

Microscopic structure of the stenosed comus arteriosus of the right ventricle in congenital heart defects and the changes occurring following direct operations on it. Grud. khir. 2 no.4:37-46 JI-Ag '60. (MIRA 15:6)

1. Iz otdela patologicheskoy anatomii (zav. - doktor med.nauk D.S. Sarkisov) Instituta khirurgii imeni A.V. Vishnevskogo (dir. - deystvitel'nyy ohlen AMN SSSR prof. A.A. Vishnevskiy) AMN SSSR.  
(HEART--SURGERY) (TETRALOGY OF FALLOT) (HEART--DISEASES)

SARKISOV, D.S.; DARBINYAN, T.M.; TSUKERMAN, B.M.; KHYMSKIY, L.D.

Production of chronic cardiac aneurysms in rabbits. Eksper. khir.  
5 no. 2:53-54, Apr '60. (MIRA 14:1)

(ANEURYSMS) (CORONARY HEART DISEASE)

KRYMSKIY, L.D.

Histotopographic study of changes in the myocardium in congenital heart defects. Eksper. khir. 5 no.4:34-42 Je-Ag '60.

(HEART--ABNORMALITIES AND DEFORMITIES) (MIRA 13:12)

SARKISOV, D.S.; DARBINIAN, T.M.; MAZAYEV, P.N.; KRYMSKIY, L.D.; TSUKERMAN,  
B.M.

Method inducing graduated stenosis of the aorta and its correction  
for studying the reversibility of hypertrophy of the myocardium.  
Eksper. khir. 5 no. 5:11-17 '60. (MIRA 14:1)  
(AORTA—DISEASES)

KRYMSKIY, L.D.

Pathological anatomy of complications following the surgical treatment of congenital heart defects. Vest. AMN SSSR 15 no. 11:38-46 '60.  
(MIRA 13:12)

1. Institut khirurgii imeni A.V. Vishnevskogo AMN SSSR.  
(HEART--SURGERY)

KRYMSKIY, L.D., kand.med.nauk; KHARNAS, S.Sh., kand.med.nauk

Vascular changes in an intestine with gangrene and perforations  
as consequence of a hypertension crisis. Kaz.med.zhur. 41 no.1:  
44-46 Ja-F '60. (MIRA 13:6)

1. Iz instituta khirurgii AMN SSSR im. A.V. Vishnevskogo (direk-  
tor - deystv. chlen AMN SSSR prof. A.A. Vishnevskiy).  
(INTESTINES--DISEASES) (HYPERTENSION)

KRYMSKIY, L.D., kand.med.nauk; MORDKOVICH, M.R. (Moskva)

Clinical and anatomical studies on myocardial lesions in congenital heart defects. Klin.med. 39 no.5:117-123 My '61.

(MIRA 14:5)

1. Iz otdela patologicheskoy anatomii (zav. - doktor med.nauk  
D.S. Sarkisov) Instituta khirurgii imeni A.V. Vishnevskogo AMN  
SSSR (dir. - deystvitel'nyy chlen AMN SSSR prof. A.A. Vishnevskiy).  
(HEART—ABNORMITIES AND DEFORMITIES)

KRYMSKIY, L.D.

Profuse hemorrhage following heart surgery caused by the dissection  
of pleural adhesions and anticoagulants. Eksp.khir.i anest. 6  
no.1:27-33 '61. (MIRA 14:10)  
(ANTICOAGULANTS) (HEART—SURGERY) (PLEURA)



KRYMSKIY, L.D.

"Functional morphology of cardiac disorders" by S.S. Vail'.  
Reviewed by L.D. Krymskii. Eksp. khir. i anost. 6 no.5:60  
S-0 '61. (MIRA 15:3)  
(HEART—DISEASES)  
(VAIL', S.S.)

KRYMSKIY, L.D.

Anatomical and clinical features specific to the course of mitral stenosis of rheumatic etiology in the surgical cardiological clinic. Grud.khir. no.3:14-20 '61. (MIRA 14:9)

1. Iz otdela patologicheskoy anatomii (zav. - doktor med.nauk D.S. Sarkisov) Instituta khirurgii imeni A.V. Vishnevskogo (dir. - deystvitel'nyy chlen AMN SSSR prof. A.A. Vishnevskiy) AMN SSSR.

(MITRAL VALVE--DISEASES) (RHEUMATIC HEART DISEASE)

KRYMSKIY, L.D.

Pathological anatomy of congenital defects of the heart. Vest.  
AMN SSSR 16 no.12:80-84 '61. (MIRA 15:2)

1. Institut khirurgii imeni A.V.Vishnevskogo.  
(HEART ABNORMALITIES AND DEFORMITIES)

VISHNEVSKIY, A.A., prof.; GALANKIN, N.K., doktor med. nauk; ARAPCV, A.D.;  
AKHMETOV, A.M.; VINITSKAYA, R.S., kand. biol. nauk; VOLYNSKIY,  
Yu.D.; DARBINYAN, T.M., kand. med. nauk; DONETSKIY, D.A., kand.  
med. nauk; KLEMENOVA, Ye.S.; KUDRYAVTSEVA, A.M., kand. med. nauk;  
KRYMSKIY, L.D., kand. med. nauk; LOKSHINA, K.A.; MAZAYEV, P.N., prof.; PANOVA,  
Yu.M.; PRCMTOVA, T.N., kand. biol. nauk; PYL'TSOV, I.M.; SERGEYEVA,  
K.A., kand. med. nauk; KHARNAS, S.Sh., kand. med. nauk; KHRUSHCHEVA,  
kand. med. nauk; TSUKERMAN, B.M., kand. biol. nauk; SHIK, L.L.,  
prof.; GOL'DGAMMER, K.K., red.; BALDINA, N.F., tekhn. red.

[Congenital defects of the heart and large vessels] Vrozhdennye po-  
roki serdtsa i krupnykh sosudov; rukovodstvo dlia vrachei. Mo-  
skva, Medgiz, 1962. 577 p.  
(MIRA 16:1)

1. Deystvitel'nyy chlen Akademii meditsinskikh nauk SSSR (for  
Vishnevskiy).

(CARDIOVASCULAR SYSTEM--DISEASES)

KRYMSKIY, L.D. (Moskva)

Pathological anatomy of the tetralogy, pentad and triad of Fallot.  
Arkhnat. no.1:3-16 '62.  
(MIRA 15:1)

1. Iz otdela patologicheskoy anatomii (zav. - doktor med.nauk  
D.S. Sarkisov) Instituta khirurgii imeni A.V. Vishnevskogo  
(dir. - deystvitel'nyy chlen AMN SSSR prof. A.A. Vishnevskiy)  
AMN SSSR.

(TETRALOGY OF FALLOT)

KRYSKIY, L.D.

Results of adhesive pericarditis following heart operations.  
Sbor.trud.Inst.khir.AMN SSSR no.1:34-38 '62. (MIRA 16:1)  
(PERICARDITIS) (HEART--SURGERY)

KRYMSKIY, L.D.

Compensatory changes in the myocardium in cardiosclerosis in  
patients with congenital heart defects. Sbor.trud.Inst.khir.  
AMN SSSR no.1:39-52 '62. (MIRA 16:1)  
(HEART--ABNORMITIES AND DEFORMITIES) (HEART--DISEASES)

KRYMSKIY, L.D.; ARUTYUNOV, V.D.

Stereoangiostgenographic and histotopographic study of the  
cardiac vessels in congenital defects. *Kardiologiya* 2 no.5:  
27-33 8-0 '62. (MIRA 15:12)

1. Iz Instituta morfologii cheloveka AMN SSSR (dir. - chlen-  
korrespondent AMN SSSR prof. A.P.Avtzyn) i otdela patologicheskoy  
anatomii (zav. - doktor med.nauk D.S.Sarkisov) Instituta  
khirurgii imeni A.V.Vishnevskogo AMN SSSR (dir. - deystvitel'nyy  
chlen AMN SSSR prof.A.A.Vishnevskiy).  
(HEART--ABNORMITIES AND DEFORMITIES)(ANGIOCADIOGRAPHY)



KRYMSKIY, L.D.

Cardiosclerosis in congenital heart defects. Vest.AMN SSSR 17  
no.7:59-68 '62. (MIRA 15:10)

1. Institut khirurgii imeni A.V.Vishnevskogo AMN SSSR.  
(HEART--ABNORMITIES AND DEFORMITIES) (HEART--DISEASES)

KRYSKIY, L.D.

Analysis of the causes of death in patients with congenital heart defects based on data from the A.V.Vishnevskii Institute of Surgery of the Academy of Medical Sciences of the U.S.S.R. for a seven-year period. Vest.AMN SSSR 17 no.11:71-82 '62.

1. Institut khirurgii imeni Vishnevskogo AMN SSSR. (MIRA 16:1)  
(HEART--DISEASES) (DEATH--CAUSES)

SARKISOV, D.S.; DARBINYAN, T.M.; MAZAYEV, P.N.; KRYMSKIY, L.D.;  
RUBETSKOY, L.S.

Data on the problem of the reversibility of lesions of the  
cardiovascular syste. Sbor.trud.Inst.khir.AMN SSSR no.1:61-  
83 '62. (MIRA 16:1)

(CARDIOVASCULAR SYSTEM--DISEASES)

KRYMSKIY, Leonard Davydovich; AVERBAKH, M.M., red.; LYUDKOVSKAYA,  
N.I., tekhn. red.; BASHMAKOV, G.M., tekhn. red.

[Pathological anatomy of congenital heart defects and complications following their surgical treatment] Patologicheskaya anatomia vrozhdennykh porokov serdtsa i oslozhnenii posle ikh khirurgicheskogo lechenia. Moskva, Medgis, 1963. 422 p.

(MIRA 16:7)

(HEART--DISEASES) (HEART--SURGERY)

KRYMSKIY, I. D.

Pathological anatomy of congenital malformations of the heart and complications following their surgical treatment.

7th National Congress of Czech. Morphologists, Oloumad, Czech.  
Medical Society of J. E. Purkyne, Czech. 23-29 June 1963

SARKISOV, D.S.; KRYMSKIY, L.D. (Moskva)

Methodology of autopsy to examine the lungs for differentiation  
of various forms of atelectasis. Arkh. pat. 25 no.7:84-85 '63  
(MIRA 16:12)

1. Iz Instituta khirurgii imeni A.V.Vishnevskogo (dir. - dey-  
stvitel'nyy ohlen AMN SSSR prof. A.A. Vishnevskiy) AMN SSSR.

DARBINYAN, T.M.; SARKISOV, D.S.; KRYMSKIY, L.D.; CHEZNYAKHOVSKIY, F.R.

Postoperative pulmonary atelectasis in patients with congenital heart defects. Grud. khir. 5 no.6:26-34 N-D'63 (MIRA 17:2)

1. Iz Instituta khirurgii imeni A.V.Vishnevskogo (direktor deystvitel'nyy chlen AMN SSSR prof. A.A. Vishnevskiy) AMN SSSR. Adres avtorov: Moskva, B. Serpukhovskaya ul., d. 27. Institut khirurgii imeni A. Vishnevskogo.

KRYMSKIY, L.D. (Moskva, B-140, Krasnoprudnaya ul., d. 30/34, kv.111)

Pathological anatomy of congenital stenosis of the arterial conus  
of the left ventricle. Grudn. khir. 4 no.5:32-39 S-0'62  
(MIRA 17:3)

1. Iz otdela patologicheskoy anatomii ( zav. - doktor med. nauk  
D.S. Sarkisov ) Instituta khirurgii imeni A.V. Vishnevskogo (dir.  
deystvitel'nyy chlen AMN SSSR prof. A.A. Vishnevskiy) AMN SSSR.



SMELOVSKIY, S.I.; DARBINYAN, T.M.; KRYMSKIY, L.D.

Extrapericardial fixation of the stump of the left pericardial  
appendage by a blind suture of the pericardium as a method  
of preventing some complications following mitral commissurotomy.  
Eksper. khir. i anest. 7 no.5:24-28 S-O '62.

(MIRA 17:10)

1. Iz Instituta khirurgii imeni Vishnevskogo (dir.- deystvitel'nyy  
chlen AMN SSSR prof. A.A. Vishnevskiy) AMN SSSR.

SARKISOV, D.S.; KRYMSKIY, L.D. (Moskva)

Characteristics of blood circulation in the lungs in congenital heart defects of the Fallot type. Arkh. pat. 25 nos 4:38-43 '63  
(MIRA 17:4)

1. Iz Instituta khirurgii imeni A.V. Vishnevskogo (direktor deystvitel'nyy chlen AMN SSSR prof. A.A. Vishnevskiy) AMN SSSR.

RABEY, Anatoliy Colomonovich, doktor med. nauk; KRYMSKIY, L.D.,  
red.

[Sarcoidosis; clinical aspects, pathological anatomy,  
etiology and treatment] Sarkoidoz; klinika, patologiches-  
skaya anatomia, etiologiya i lechenie. Moskva, Meditsina,  
1964. 309 p. (MIRA 17:8)

KRYMSKIY, L.D. (Moskva B-140, Krasneprudnaya ul., d. 30/34, kv.111)

Fibroelastosis and congenital heart defects. Grud. khir. 6  
no.6:20-27 N-D '64. (MIRA 18:7)

1. Otdel patologicheskoy anatomii (zav. - prof. D.S. Sarkisov)  
Instituta khirurgii imeni A.V. Vishnevskogo (direktor - deyst-  
vitel'nyy chlen AMN SSSR prof. A.A. Vishnevskiy) AMN SSSR, Moskva.

EMERY, L.D.

Some theories of the etiology and pathogenesis of congenital  
heart defects. Eksper. khir. i anest. 9 no.3:35-37 My-Je '64.  
(MIRA 18:3)

KRYMSKIY, L.D.

Anatomicoclinical characteristics of interauricular and inter-ventricular septal defects in congenital vitium cordis. Vest. AMN SSSR 19 no,6:81-88 '64. (MIRA 18:4)

1. Institut khirurgii imeni Vishnevskogo AMN SSSR.

VLADIMIRSKAYA, Ye.B.; IRVMSKIY, L.D.

Importance of autoradiography in the study of the kinetics of blood cells. Vest. AMN SSSR 20 no.10:78-82 '65.

(MIRA 18:10)

1. Institut pediatrii AMN SSSR i Institut khirurgii imeni A.V. Vishnevskogo AMN SSSR, Moskva.

KRYMSKIY, L.D.; GEL'FAND, V.B.

Clinical anatomical characteristics of the changes in the central nervous system in congenital heart defects in children. Zhur. nevr. i psikh. 65 no.7:968-974 '65. (MIRA 18:7)

1. Pervoye khirurgicheskoye otdeleniye (zav. - prof. N.K.Galankin) i otdel patologicheskoy anatomii (zav. - prof. D.S.Sarkisov) Instituta khirurgii imeni Vishnevskogo (dir. - prof. A.A.Vishnevskiy) AMN SSSR, Moskva.



KREMSKIY, I.D.; VOLYNSKIY, Yu.D.

Revision of the meaning included in the concepts of "tetrad,"  
"pentad" and "triad" of Fallot. Vest. AMN SSSR no.4:79-78  
'65. (MIRA 18:10)

1. Institut khirurgii imeni A.V. Vishnevskogo AMN SSSR,  
Moskva.

GALANKIN, N.K.; MALYAVIN, G.T.; KRYMSKIY, L.D.; ARAPOV, A.D.

Combination of tetralogy of Fallot with other developmental anomalies. Grud. khir. 6 no.1:32-36 Ja-F '64. (MIRA 18:11)

1. Institut khirurgii imeni Vishnevskogo (dir. - deystvitel'-nyy chlen AMN SSSR prof. A.A. Vishnevskiy) AMN SSSR, Moskva. Adres avtorov: Moskva, B. Serpukhovskaya ul., d.27, Institut khirurgii imeni Vishnevskogo. Submitted October 20, 1962.

KRYMSKIY, M.I.

[Mechanization of lifting and transporting in connection with  
the repair of equipment] Mekhanizatsiia pod'emno-transportnykh  
rabot pri remonte oborudovaniia. Moskva, Gos. izd-vo obor. pro-  
myshl., 1953. 24 p. (MLRA 7:8)

(Lifting and carrying)

KRYMSKIY, M.M., inzh.

Twisting of steel reinforced aluminum wires. Vest.elektroprom.  
33 no.6:58 Je '62. (MIRA 15:7)  
(Electric lines--Overhead)

**KRYMSKIY, N.P., inzhener.**

**Precast reinforced concrete shed roofs for industrial buildings  
of the cotton industry. Bet. 1 zhel.-bet. no. 1:9-14 Ja '56.  
(Roofs, Concrete)**

**(MIRA 9:4)**

KRYMSKIY, N.P., inzh.

Panel-trussed roofs made of precast reinforced concrete. Bet. 1  
zhel.-bet. no.6:238-245 Je '57. (MLRA 10:11)  
(Roofs, Concrete)

**AUTHOR:** Krymskiy, N.P., Engineer. SOV/57-57-11-3/10

**TITLE:** Precast Reinforced Concrete for Industrial and Agricultural Purposes (Sbornyy zhelezobeton v promyshlennom i sel'skokhozyaystvennom stroitel'stve).

**PERIODICAL:** Beton i Zhelezobeton, 1957, Nr 11, pp 430-437. (USSR)

**ABSTRACT:** An historical survey of the manufacture and use of precast reinforced concrete products is given together with the following illustrations and tables: Figure 1 - reinforced concrete window frames from the Ozurgetskaya factory: Table 1 - list of buildings constructed of precast reinforced concrete, up to 1941, and types of cranes used for assembly: Figure 2 - double columns of the Nizhniy Tagil Railway Truck factory: Figure 3 - assembly of precast concrete constructions of a Metallurgical factory: Figure 4 - construction of a depot for the Moscow subway: Table 2 - figures for precast reinforced concrete buildings completed between 1950 and 1956. The TsK KPSS and the Soviet of Ministers of the USSR, announced in 1954, the building of 605 new factories for precast reinforced concrete products with a total capacity of 7,699,000m<sup>3</sup>. These factories are to be completed at the end of 1957. The spans of precast beams were increased

Card 1/2

SOV/97-57-11-3/10  
Precast Reinforced Concrete for Industrial and Agricultural Purposes.

from 12 and 15m to 24m and frames manufactured with a span of up to 30m. At the same time large savings in reinforcement were achieved. Figure 5 - shows the assembly of a frame of 30m span, weighing 13.2 tons, made from precast prestressed reinforced concrete: Figure 6 - a reinforced concrete dome covering an area of 40x40m in plan built in Avtovo, with a total weight of 518 tons, assembled from 133 slabs, ends being supported on 4 segmental arches: Figure 7 - construction of the main hall of a district heating station: Figure 8 - the assembly of a multi-storey warehouse. Precast reinforced concrete was widely used for underground ducts (Figure 9), for strutting mining galleries (Figure 10) and underground railway tunnels (Figure 11): Table 3 - figures for various types of roof construction for industrial buildings: Table 4 - values for various types of roof-beams and roof-frames. Recent use of precast reinforced concrete for agricultural buildings: stables (Figure 12), buildings for agricultural machinery (Figure 13) and grain stores (Figure 14). Table 5 gives the weights of beams and frames manufactured in various countries. There are 14 figures and 5 tables.

1. Reinforced concrete--Production
2. Reinforced concrete--Applications

Card 2/2



KRYMSKIY, P.

Transforming uneven land into valuable pastures and meadows.  
Nauka i pered. op. v sel'khoz. 9 no.4:66-67 Ap '59.  
(MIRA 12:6)

1. Direktor Tuzskiy remonto-tekhnicheskoy stantsii Ryazanskoy oblasti.  
(Pastures and meadows)

KRYMSKIY, S.

Planning in new conditions. Mast. ugl. no. 4:6 '59.  
(MIRA 12:6)

1. Nachal'nik planovo-ekonomicheskogo otdela Luganskogo  
sovnarkhosa.

(Mine management)

GURVICH, Sokrat Solomonovich; PETLENKO, Viktor Porfir'yevich;  
TSAREGORODTSEV, Gennadiy Ivanovich; FEDERENKO, Ye.G.,  
doktor fil. nauk, prof., red.; BYCHKO, I.V., kand. fil.  
nauk, otv. red.; KRYMSKIY, S.B., kand. fil. nauk, otv.  
red.

[Problems of dialectical materialism; for lectures on  
philosophy for medical institutes] Voprosy dialekticheskogo  
materializma; k lektsiam po filosofii dlia meditsinskikh  
institutov. Pod red. E.G.Fedorenko. Kiev, Gosmedizdat USSR  
1964. 361 p. (MIRA 17:6)

*KRYMSKIY, S.S.*

USSR / Farm Animals. Small Horned Stock.

Abs Jour: Ref Zhur-Biol., No 9, 1958, 40452. Q

Author : Nozdrachev I. F., Krymskiy S. S.

Inst : Not given.

Title : Sheep Breeding in Kazakhstan.

Orig Pub: Ovtsevodstvo, 1957, No 11, 31-34.

Abstract: No abstract.

Card 1/1

KRYMSKIY, S.Yo.

Some shortcomings in planning at the Lugansk Economic Council mines.  
Ugol'33 no.10:34-36 0 '58. (MIRA 11:11)

1. Luganskiy sovnarkhoz.  
(Lugansk--Mine management)

KRYMSKIY, V.A., inzhener; LOSEV, Ye.A., inzhener.

Roller mandrels used in centerless grinding of bearing bush cones.  
Mashinostroitel' no.6:35-36 Je '57. (MIRA 10:7)  
(Chucks) (Grinding and polishing)

KRYMSKIY, V.A., insh.; CHICHEROV, N.N., insh.

New clamping chucks. Mashinostroitel' no.9:29-30 S '57. (MLBA 10:9)  
(Chucks)

KRYZHEV, V.I.

Lophelino syenites in the Upper Peto Valley in the Eastern Sayan Mountains. Geol. i geofiz. no. 9:111-114, '60.

(MIRA 14:2)

I. Institut geologii i geofiziki Sibirskogo otdeleniya AN SSSR, Novosibirsk.

(Peto Valley--Lophelino syenite)



KRYMSKIY, V.M.

Stratigraphic correlation of the Igarka region with the Strel'nogorsk  
and Nizhnosukharikha effusives, Dokl. AN SSSR 164 no.5:119-1121 0  
'65. (MIRA 18:10)

1. Krasnoyarskoye otdeleniye Sibirskogo nauchno-issledovatel'skogo  
instituta geologii, geofiziki i mineral'nogo syr'ya. Submitted  
April 3, 1965.

KRYMSKIY, V.M.

Sedimentary, diagenetic, and pseudo-hydrothermal siderites of  
the Minusinsk coal basin. Trudy SNIIGGIMS no.35:203-209 '64.  
(MIRA 18:5)

KRYMSKIY, V.V.

Derivation of a formula for determining the actual mineral content  
of ores. Sbor. trud. VNIITSVETMET no.4:264-269 '59. (MIRA 16:8)

(Ores—Sampling and estimation)

KRYMSKIY, Ya.

Courses to increase skills. Sel'. stroi. no.7:26 '62.

(MIRA 15:8)

1. Direktor kursov povysheniya kvalifikatsii inzhenerno-tekhnicheskikh  
rabotnikov pri Gosudarstvennom komitete Soveta Ministrov RSFSR po  
delam stroitel'stva i arkitektury.

(Building—Study and teaching)

LAKHTIN, Yu.M.; KRYMSKIY, Yu.N.; SEMENOV, R.A.

Nitriding high-strength cast iron in a glow discharge. Metalloved.  
i term. obr. met. no.3:37-41 Mr '64. (MIRA 17:4)

1. Moskovskiy avtodorozhnyy institut.

KALUGIN, V.P.; KRYMUS, V.N.

Age of the Chaaldzha series in the western Kopetdag. Sov.  
geol. 6 no.9:150-153 S '63. (MIRA 17:10)

1. Tsentral'naya kompleksnaya tematicheskaya ekspeditsiya  
Upravleniya geologii i okhrany neдр pri Sovete Ministrov  
Turkmeniskoy SSR.

ZELIKMAN, Abram Naumovich; KRYN, Olga Yefimovna; SAMSONOV,  
Grigoriy Valentinovich; BELIAEVSKAYA, L.V., red.

[Metallurgy of rare metals] Metallurgiya redkikh me-  
tallov. Izd. 2., perer. i dop. Moskva, Izd-vo "Metal-  
lurgiya," 1964. 568 p. (MJRA 18:1)

POMOSOV, A.V.; KRYNAKOVA, Ye.Ye.

Use of naphtha soap as anticorrosive for copper powder. Zhur.  
prikl.khim. 29 no.9:1435-1436 8 '56. (MLRA 9:11)

1. Laboratoriya elektrokhemii Ural'skogo politekhnicheskogo  
instituta imeni S.M. Kirova, Sverdlovsk.  
(Copper--Corrosion) (Soap)



KRYNCHYK, G. S. (Moscow)

"Magneto-optical Properties of Ferromagnetic Substances in the Infra-Red Region,"  
a paper submitted at the International Conference on Physics of Magnetic Phenomena,  
Sverdlovsk, 23-31 May 56.

KRYNCHYK, G. S., (Moscow)

"Ferromagnetism of Conduction Electrons," a paper submitted at the International Conference on Physics of Magnetic Phenomena, Sverdlovsk, 23-31 May 56.

"Certain Peculiarities of Contemporary Oceanographic Works"  
Metropol. i Gidrometeorol., No 1, 33-36, 1954

The author describes examples of the execution of oceanographic (hydrologic) observations that take into account the present-day possibilities of one's operating with large series of instruments and at considerable speed and of one's employing automatic recorders and conducting observations under unfavorable weather conditions on ships at anchor in great depths. (RZhGeol, no 6, 1954)

SO: Sum. 492, 12 May 55

KRYNDIN, A. N.

AUTHOR: Kryndin, A. N.

TITLE: On Correlation between the Extent and Thickness of Ice in the Baltic Sea  
(O sootnoshenii mezhdru ledovitost'yu i tolshchinoy l'da v Baltiyskom more)

PERIODICAL: Meteorologiya i Gidrologiya, 1957, No. 2, pp. 19-23 (U.S.S.R.)

ABSTRACT: In the brief article which contains extensive data to be explained below, the author defines "ice extent" (ledovitost') as the entire ice mass forming in the sea within a specified period. He holds that for most seas, the Baltic included, the paucity of observations precludes a direct, reliable calculation of the amount and thickness of drifting ice. The central problem dealt with is how to clarify the relationship between the two main features of the ice cover (area of distribution and thickness).

Materials were used from 40 Scandinavian stations to trace the variability in the ice budget from year to year, wherein one observes readily the fact that ice thickness is subjected to the same variations as the extent of ice. Correlation coefficients computed for the relation between ice extent and thickness proved to be quite high,

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On Correlation between the Extent and Thickness of Ice  
in the Baltic Sea

namely for Swedish stations,  $r = 0.85 \pm 0.04$ , for Finnish stations,  $r = 0.78 \pm 0.05$ , and for both combined,  $r = 0.83 \pm 0.04$ , indicating that the relation between ice extent and thickness is not fortuitous. Hence the development of ice cover in the sea both vertically and horizontally is governed by the same general laws. Owing to scarcity of data on thicknesses of drift ice, thickness of fast ice was used in the analysis; however, the accretion pattern of ice cover and ice thickness in the same sea should also correspond to that of drifting ice. The author concludes that the use of an ice distribution area in the sea for an evaluation of the ice budget is quite feasible as long as further data are unavailable on amount and thickness in the open sea. He also contends that his method of evaluating the ice budget according to the accretion of the fast shore ice (pripai) should aid the hydro-meteorological services since additional observations and expenses are unnecessary.

Personalities mentioned are V. Yu. Vize, N. N. Zubov, and R. Yurva (not given a reference number). These investigators made studies on ice cover in the sea, in which they operated under the same handicap as Kryndin, namely, they had to limit the concept of

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On Correlation between the Extent and Thickness of Ice  
in the Baltic Sea

"ice extent" to the area of ice distribution in the sea. Is. Ostman (1) is cited for contributing ice thickness data for Swedish stations. E. Palosuo (3) furnished data on maximum ice cover in the Baltic Sea. Pre-1910 data were not introduced owing to their very approximate nature. There are three references cited, none of which are Slavic (2 Swedish, 1 Finnish).

The only figure given consists of a group of six graphs depicting ice area in thousands of square kilometers which is plotted against ice thickness expressed in centimeters for three Swedish and two Finnish stations, the sixth graph giving the same pattern averaged for all Baltic stations. This figure clearly shows that, in winters with slight ice amounts, corresponding to the segment of the curve up to an ice cover of 200,000 sq/km, the relation between ice thickness and area is expressed most clearly and at this point can be regarded as practically linear. For winters with a greater ice cover, the relation becomes much more complex. Undoubtedly these features are caused by the substantial differences in  $t^{\circ}$  and wind conditions over

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On Correlation between the Extent and Thickness of Ice  
in the Baltic Sea

APPROVED FOR RELEASE: 04/03/2001 CIA-RDP86-00513R000826910007-8

the shore line configuration and the bathymetry of the Baltic Sea play a role in this increased complexity in the ratio of ice extent to thickness.

The only table takes up pages 21 and 22 and portrays extensive numerical data for each winter from 1910 to 1936 for 20 Swedish stations and from 1914-1936 for 20 Finnish stations. The tabular data give maximum ice thicknesses in centimeters for such points as Karlsborg, Luleo, Stagsund, Furusund and Stockholm on the Swedish coast and Helsinki and Ulkokalla on the Finnish coast. Maximum ice extent in the sea is given in thousands of sq/km for each winter.

ASSOCIATION:

PRESENTED BY:

SUBMITTED:

AVAILABLE:

Card 4/4

KRYIDIN, A.N.

Year-to-year changes in the iciness of the Baltic Sea and the possibility of forecasting them on the basis of a calculation of the autumn and prewinter thermal state of the ocean and atmosphere. Trudy GOIN no.86:3-35 '65. (MIRA 18:9)

ACCESSION NR: AT4038021

8/2634/64/000/071/0005/0082

AUTHOR: Kry\*ndin, A. N.

TITLE: Seasonal and annual variations in the ice cover and position of the ice edge on the Far Eastern seas in connection with peculiarities in the atmospheric circulation

SOURCE: Moscow. Gosudarstvenny\*y okeanograficheskiy institut. Trudy\*, no. 71, 1964. Issledovaniye izmenchivosti ledovitosti nekotory\*kh morey (Investigating the variability in ice formation on some seas), 5-82

TOPIC TAGS: meteorology, oceanography, ice, marine ice, ice cover, atmospheric circulation, ice formation

ABSTRACT: The article discusses the mean-monthly values for the ice extension and ice edge for the Sea of Japan, Sea of Okhotsk and the Bering Sea, calculated on the basis of shipboard and aircraft observations during the winters from 1928/29 to 1959/60. The seasonal and annual variations in the extent of the ice cover and the position of the ice edge are analyzed in detail. A comparative appraisal is made of characteristic elements

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ACCESSION NR: AT4038921

observed in the variation of the ice cover and the position of the ice edge on the seas of the entire Far Eastern Basin. The concluding section of the paper is devoted to an investigation of fluctuations in the extent of the ice cover on the seas in question as a function of seasonal and annual variations in atmospheric circulation in the Far East and northern reaches of the Pacific Ocean. It is also assumed that this paper will serve in the future as a basis for the development of methods of long-term prognostication regarding the ice cover and ice edge for each of the Far Eastern seas individually and for the entire basin as a whole. By the term "ice cover extension" is here understood the area of dissemination of ice at sea; it may be expressed both in an absolute form ( $\text{km}^2$ ) and in a relative form (in percentages or arbitrary units relative to the entire area of the sea). Together with data on the ice shelf or "edge", this parameter makes it possible to reach conclusions regarding the amount of ice at sea and its distribution. Such information may be of substantial aid in the planning and implementation of winter transport and fishing operations. Quantitative characteristics of the ice cover of the seas are also necessary in the study of a number of scientific problems: Thus, the sea ice cover plays an important role in the heat and moisture transfer mechanism over the globe, while local atmospheric and hydrological processes depend on the quantity of ice on the seas and on its distribution.

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ACCESSION NR: AT4038921

In the first chapter of the first section the author discusses the results of ice observations, taking up the problem of precisely what basic data are necessary to calculate the overall volume of ice at sea in terms of the extent of the cover, continuity, thickness and hummock qualities of the ice. The different methods of obtaining information on each of these criteria are analyzed (shipboard, aircraft, visually from the shore, etc.) and the special advantages and disadvantages of each technique as they apply to the general problem of ice cover investigation are noted. Ice drifting is discussed and the various methods currently in use to study this phenomenon are indicated. It is emphasized that the continuity, thickness and hummock properties of floating ice in the open sea and also ice drifting are distinguished by extreme variability in time and space. The present state-of-the-art of the fundamental types of ice observations at sea is regarded by the author as unquestionably unsatisfactory and in need of "serious improvement". The need to reorganize the operations of coastal hydrometeorological stations and posts is stressed. For open-sea areas the author recommends the use of aviation for systematic observations of ice drifting, by the method of sequential aerial photography of prominent ice flows in normal ice sections and the tracking of the paths of active reflectors dropped on the ice. The author ventures the

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ACCESSION NR: AT4038921

opinion that a knowledge of variations in the extent of the ice cover and ice edge will promote greater progress in the study of the peculiarities in the advent of different ice phases in the coastal zone. In the second chapter of the first section there is a detailed discussion of methods for taking into consideration atmospheric circulation in the long-term forecasting of ice occurrence. The problem of the unsatisfactory state of long-term ice forecasting at sea is considered and two fundamental points of view are presented as indicative of the disagreement presently in evidence on this subject. One group of investigators holds that reliable prognostication of ice phenomena is possible only on the basis of reliable long-term weather forecasts, since ice formation is determined by the weather. Other investigators, recognizing the fact that the problem of long-term weather forecasting has not yet been solved, suggest that sufficiently effective techniques for ice prognostication can be developed independently of a long-term forecasting of the weather, but based on a thorough knowledge of the ice regime of the sea and the relation of its variations to general-circulation and local factors which determine both the weather and the ice processes. The author notes that the methods based on this second hypothesis are largely ineffectual. This is true for many reasons and primarily because of the difficulty of the problem, the unreliability of the indices of atmospheric circulation thus far in use and insufficient series of factual

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observations. All these questions are discussed in this section, along with the author's belief that the first point of view is also incorrect. There is an exhaustive analysis and criticism of the methods of forecasting proposed and used by Belinsky (N. A. Belinsky, 1946. *Opyt ustanovleniya indeksa tsirkulyatsii atmosfery\**. Trudy\* NIU GUGMS\* ser. V, vy\*p. 14). After a detailed review of modern methods for estimating atmospheric circulation, as employed in the long-term prognostication of hydrometeorological phenomena, the author concludes that the indices of Katz and Drogaytsev are most acceptable for the purposes of ice prognostication. These methods are completely objective and give a physically justified representation of the horizontal transfer of air masses and of the advection of heat and cold connected with it. The need for the computerization of the Katz and Drogaytsev indices is emphasized. The second, third and fourth sections of the article deal with the variability of the ice cover extension and the position of the ice edge on the Sea of Japan (Section II), the Sea of Okhotsk (Section III) and the Bering Sea (Section IV). The structure of each section is as follows: a chapter on basic data, a chapter on the variability of the ice flow extension and position of the ice edge during the ice season, and a chapter on this variability from year-to-year. The fifth section is devoted to a comparative estimate of the elements

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ACCESSION NR: AT4038921

causing the variations in ice formation on the three seas in question, while in the sixth (and final) section the author analyzes in detail the interrelation between the ice formation mechanism observed on the seas of the Far East and atmospheric processes. Orig. art. has: 21 figures, 22 tables and 1 appendix.

ASSOCIATION: Gosudarstvennyy okeanograficheskiy institut, Moscow (State Institute of Oceanography)

SUBMITTED: 00

DATE ACQ: 04 June 64

ENCL: 00

SUB CODE: ES

NO REF SOV: 021

OTHER: 000

Card 6/8

KRYNDIN, A.H.

Seasonal and year-to-year changes in ice conditions and the ice limit in the Black Sea and the Sea of Azov in connection with the characteristics of atmospheric circulation. Trudy GOM no.76: 7-79 '64 (MIRA 18:1)

KRYNDIN, A.N.

First cruise of the research ship "I.U.M.Shokal'ski" and its  
scientific results. Okeanologiya 1, no.3:543-549 '61.  
(MIRA 16:11)

KRYNDIN, A.N., kand. geograf, nauk; ISAYEVA, G.N.

"Heat inertia" of the ocean. Meteor. i gidrol. no.11:37-41 N '64.  
(MIRA 17:12)

1. Gosudarstvennyy okeanograficheskiy institut i Mirovoy meteorolo-  
gicheskiy tsentr.



KRYNDIN, A.M.

Seasonal and year-to-year changes in the ice conditions and the position of the ice edge in the Far Eastern seas in connection with the characteristics of atmospheric circulation. Trudy GOIN no.71:5-82 '64. (MIRA 17:10)

KONONOVA, Zh.G.; KRYNETSKAYA, N.N.

Rapid method for determining the impure sodium disilicate modulus.  
Nefteper. i neftekhim. no.10:21-22 '63. (MIRA 17:2)

1. Salavatskiy kombinat.

ACC NR: AP7004909

(N)

SOURCE CODE: UR/0109/66/011/012/2248/2248

AUTHOR: Krynetskiy, B. B.; Kuz'min, G. P.; Shirokov, A. V.

ORG: none

TITLE: Cooled circulator for 3 cm wavelength

SOURCE: Radiotekhnika i elektronika, v. 11, no. 12, 1966, 2248-2248

TOPIC TAGS: microwave component, ferrite

## ABSTRACT:

A Y-type circulator which operates with a quantum paramagnetic amplifier of 3 cm wave range is described. A garnet-structured calcium-vanadium ferrite was used as the active material. The ferrite has the following characteristics: the width of the ferromagnetic resonance line at temperatures of 300, 77, and 4.2K are 150, 280, and 340 gauss, respectively. A disk-shaped ferrite 8.25 mm in diameter inserted into a teflon washer with an outside diameter of 20 mm was installed at the center of the circulator. Operation of the circulator is satisfactory at temperatures ranging from 300 to 4.2K. At the temperature of liquid helium, maximum decoupling was 46 db, and direct losses amounted to approximately 0.8db. The bandwidth of the circulator at 20-db decoupling was 170 me. Orig. art. has: 1 figure.

[GS]

SUB CODE: 09/ SUBM DATE: 23May66/ ORIG REF: 001/ OTH REF: 001/ ATD PRESS: 5115  
Card 1/1 UDC: 621.375

ACC NR: AP7004909

(N)

SOURCE CODE: UR/0109/66/011/012/2248/2248

AUTHOR: Krynetskiy, B. B.; Kuz'min, G. P.; Shirokov, A. V.

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[GS]

SUB CODE: 09/ SUBM DATE: 23May66/ ORIG REF: 001/ OTH REF: 001/ ATD PRESS: 5115  
Card 1/1 UDC: 621.375

L 4190-66 EWA(k)/FBD/EWT(1)/EWP(e)/EWT(m)/EPF(c)/EEC(k)-2/EWP(1)/T/EWP(t)/EWP(b)/  
EWP(k) /EWA(m)-2/EWA(h) SCTB/LJP(c) WG/JD/WW/GG/WH

ACCESSION NR: AP5022745

UR/0181/65/007/009/2865/2866

AUTHOR: Karlov, N. V.; Krynetskiy, B. B.

73  
74

TITLE: Inversion and line width of paramagnetic resonance absorption in chromium-containing rutile at 20-cm wavelengths

SOURCE: Fizika tverdogo tela, v. 7, no. 9, 1965, 2865-2866

TOPIC TAGS: quantum device, titanium dioxide, electron paramagnetic resonance, EPR, line width

31-27

ABSTRACT: The purpose of the study was to determine the dependence of the inversion and of the width of the EPR lines in chromium doped rutile on the Cr<sup>3+</sup> concentration, in view of the use of this material in quantum amplifiers. The tests were made in the 20-cm band, which is of interest in radioastronomy. The external magnetic field was oriented along the c-axis of the tested crystals. The measurements were made at 4.2K. The Cr<sup>3+</sup> content was 0.07, 0.1, 0.15, or 0.3%. At these concentrations the EPR line shape was intermediate between Gaussian and Lorentzian, and was found to be proportional to the square root of the concentration, as called for by the theory. The results are tabulated in the Enclosure. The inversion was deter-

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L 4190-66

ACCESSION NR: AP5022745

7  
mined at an auxiliary radiation frequency of 47 Gcs. The optimal concentration is 0.1%, at which the Q of the active medium, calculated from the inversion, concentration, and line width, is 80. Measurements with an actual quantum amplifier yielded Q = 70. It is concluded that rutile is a promising material for quantum amplifiers at 20 cm wavelengths. "The authors thank A. M. Prokhorov for interest in the work and R. P. Bashuk for supplying the rutile crystals." Orig. art. has: 2 tables. [02]

ASSOCIATION: Fizicheskiy institut im. P. N. Lebedeva AN SSSR (Physics Institute, AN SSSR)

SUBMITTED: 16Apr65

ENCL: 01

SUB CODE: SS, OP

NO REF SOV: 004

OTHER: 002

ATD PRESS: 4121

Card 2/3

L 4190-66

ACCESSION NR: AP5022745

ENCLOSURE: 01

Table 1. Width of Cr<sup>3+</sup> line as function of the concentration

Concentration at. %	Measured line width	Calculated line width
	(Mm)	
0.07	31	31
0.1	37	36
0.15	47	44
0.3	68	62

Table 2. Results of measurement of the inversion at different concentrations

Concentration at. %	Inversion	Inversion times concentr.
0.07	20	0.14
0.1	20	0.2
0.15	12	0.18
0.3	-1	-0.03

BYR.  
Card 3/3

L 26367-66 ENT(1)/ENT(m)/EWA(d)/EWP(t) IJP(c) JD

ACC NR: AP6012497

SOURCE CODE: UR/0181/66/008/004/1265/1267

AUTHOR: Agranovskaya, A. I.; Karlov, N. V.; Krynetskiy, B. B.

56  
53  
B

ORG: Physics Institute im. P. N. Lebedev AN SSSR, Moscow (Fizicheskiy Institut AN SSSR)

TITLE: Effect of temperature on line width and resonance field of ferromagnetic resonance in polycrystalline specimens of  $\text{Ca}_3\text{V}_{1.5}\text{Fe}_{3.5}\text{O}_{12}$

SOURCE: Fizika tverdogo tela, v. 8, no. 4, 1966, 1265-1287

TOPIC TAGS: ferromagnetic resonance, low temperature effect, SHF, ferrite, line width, magnetic anisotropy

ABSTRACT: The ferromagnetic properties of  $\text{Ca}_3\text{V}_{1.5}\text{Fe}_{3.5}\text{O}_{12}$  are studied in an attempt to determine the possibilities for using this material in SHF ferrite devices which operate at low temperatures. Line width and resonance field were measured as functions of temperature in polycrystalline specimens of this ferrite. Powder metallurgy methods were used for making the specimens. The results show an increase in line width and reduction in field intensity at low temperatures (see figure). These phenomena may be due to an increase in the magnetic anisotropy of the crystal. The temperature curve for the line width shows two maxima: the first at 4°K and the second at 7-100°K. The first is apparently due to rapid relaxation of bivalent iron ions

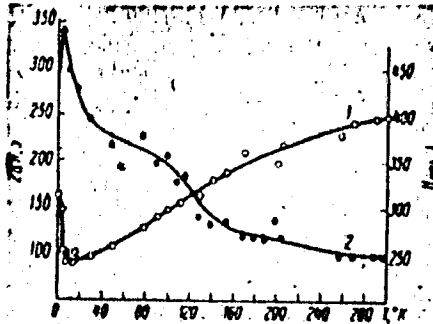
Card 1/2



L 26367-66

ACC NR: AP6012497

Temperature curve for resonance field intensity (1) and line width (2) of a polycrystalline specimen of  $\text{Ca}_3\text{V}_{1.5}\text{Fe}_{3.5}\text{O}_{12}$ .



while the second is probably associated with another phase. The rather narrow ferromagnetic resonance line at helium temperatures indicates that these ferrites may be used in low-temperature SHF devices. The authors thank A. M. Prokhorov for interest in the work and V. I. Solov'yev for discussion of problems encountered in this work.

SUB CODE: 20/

SUBM DATE: 13Oct65/

ORIG REF: 003/

OTH REF: 003

Card 2/2 11

L 38191-66 EEC(k)-2/EWP(k)/EWT(1)/EWT(m)/FBD/T/EWP(t)/ETI IJP(c)

ACC NR: AP6023867 SOURCE CODE: UR/0109/66/011/007/1196/1199

WG/JD/JG

AUTHOR: Solov'yev, Ye. G.; Abazadze, Yu. V.; Isayev, S. K.; Stepanova, Ye. G.; Krynetskiy, I. B.

ORG: none

TITLE: Traveling wave <sup>23</sup>maser using chromium-doped rutil<sup>21</sup>e and a magnet with superconducting windings

SOURCE: Radiotekhnika i elektronika, v. 11, no. 7, 1966, 1196-1199

TOPIC TAGS: solid state maser, traveling wave amplifier

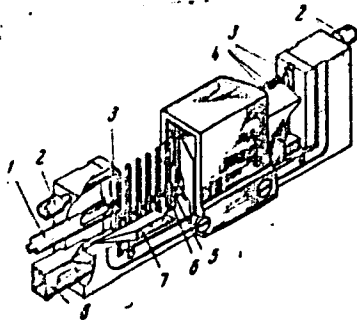
ABSTRACT: A traveling-wave maser using a rutil<sup>21</sup>e crystal doped with Cr<sup>3+</sup> is described. The maser uses a magnet with superconducting windings and is designed to work at the lower end of the decimeter band at a temperature of 4.2K. The device is placed either in a kryostat or in a helium<sup>1</sup> microcooler. The maser uses a dielectrically loaded delay comb structure (see Fig. 1), and was found to have the following characteristics: tuning range, 100 Mc; amplification, 15 to 20 db; bandwidth (at a 3-db level), 10-12 Mc; pumping power, 100 mw.

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UDC: 621.378.5.029.63

L 38191-66

ACC NR: AP6023867



Several ways of increasing the gain of the device are given. Orig. art. has: 4 figures. [IV]

Fig. 1. Basic maser components

1 - Coaxial cable; 2 - teflon screw; 3 - excitation pin; 4 - teflon filling; 5 - ferrite disks; 6 - teflon holder; 7 - active crystal; 8 - pumping waveguide.

SUB CODE: 09/ SUBM DATE: 11May65/ ORIG REF: 003/ OTH REF: 002

ATD PRESS: 5045

Card 2/2 JS

AUTHOR: Krynets'kyy, I.I. (Kiyev)

102-58-1-4/12

TITLE: ~~A Simplified Calculation of the Control Stability in Non-linear Systems (Sproshchen y rozrakhunok stalosti reguluyuvannya nelineynykh system)~~

PERIODICAL: Avtomatika (Kiyev), 1958, Nr 1, pp 44 - 49 (Ukrainian SSR)

ABSTRACT: A non-linear (relay-type non-linearity) servo is considered; the system is linearised in approximation by expanding the non-linear characteristic in a Fourier series and neglecting all but the first term and the stability of the balance position is then examined. The self-oscillation frequency is derived from this linearised equation and the complex oscillation parameter (including a damping term) is derived. A fourth-order characteristic equation is then considered and the hunting amplitude derived. Following this very brief theoretical review, various types of servo with this relay-type response (with an insensitive zone) are considered, using numerical values. The servos are: a centrifugal speed governor to an electric motor, relay-coupled to the servomotor; a pressure regulator operating via a bellows transducer and relay; and a water temperature regulator having an electronic relay. Simple flow formulae in terms of the system parameters are given in all cases.

Card 1/2

AUTHOR: Krynets'kiy, I.I. (Krinetskiy, I.I.) SOV/102-58-3-4/10

TITLE: Slowly Decaying Transients in Nonlinear Systems  
(Doslidzhennya povil'no zatukhayuchykh perekhidnykh protsesiv u neliniyrykh systemakh).

PERIODICAL: Avtomatika (Kyiv), 1958, Nr.3, pp.52-62 (USSR)

ABSTRACT: The automatic control process is assumed to be described by differential equations of order  $n$ , and to have a nonlinear characteristic (Eq.(1)). Fig.1 simply divides the system into linear and nonlinear parts. Approximate analytical formulae for the best values of the parameters are derived using the Krylov-Bogolyubov harmonic balance method. The treatment is of the standard type when this method is used; para.2 deals with the type of transient, para.3 with the maximum overshoot and the time required to reach it, para.4 with the sequence to be adopted in selecting the best values for the parameters, para.5 with the experimental verification of the general results derived in earlier sections. Tables 1 and 2 give the results; the precise systems used are not stated. The maximum discrepancy between theory

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SOV/102-00-3-4/10  
Slowly Decaying Transients in Nonlinear Systems.

and experiment is 12%. Para.6 deals with an engine speed controller with an electrically driven servo operating an astatic regulator (Fig.5). The system is described by Eqs.(25), where  $T_1$  and  $T_2$  are the characteristic times of motor and regulator, and  $x$  and  $y$  are increments to the speed and throttle position. The treatment is completely straightforward. There are 5 figures, 2 tables and 4 Soviet references.

ASSOCIATION: Instytut tayvill'noho povitryanoho flotu (Institute of the Merchant Fleet).

SUBMITTED: September 13, 1957.

Card 2/2

16.8000 (1103, 1329, 1132)

S/102/61/000/006/002/004  
D299/D305

AUTHORS: Krynets'kyi, I. I., Mozhova, E. A. and Zhalnina, D. F.  
(Kiyev)

TITLE: Investigating nonlinear astatic self-adaptive systems

PERIODICAL: Avtomatyka, no. 6, 1961, 15-25

TEXT: Stability and performance of nonlinear astatic self-adaptive systems are considered; two different approximate calculation methods are discussed. The accuracy of the approximate computations is estimated by means of exact mathematical methods and by the electronic simulators *MH-7* (MN-7) and *ИПТ-5* (IPT-5). The control process is described by the equation

$$TV\ddot{x} + (T + V)\dot{x} + x + CF(x) = 0 \quad (2)$$

where T is the time constant of the plant, C - the gain, V - the time constant of the controller, F(x) - the nonlinear characteris-

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31925

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D299/D305

Investigating nonlinear astatic ...

tic of the servomotor,  $x$  - the input variable. By means of a describing function, the nonlinear function  $F$  is linearized:

$$F(x) = h(A)x \tag{3}$$

where

$$h(A) = \frac{1}{\pi A} \int_0^2 F(A \sin \omega t) \sin \omega t \, d\omega t = \frac{4B}{\pi A^2} \sqrt{A^2 - \eta^2} \tag{4}$$

hence the nonlinear Eq. (2) reduces to the linear equation with one variable coefficient

$$TV\ddot{x} + (T + V)\dot{x} + \dot{x} + ch(A)x = 0 \tag{5}$$

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D299/D305

By the first approximate method, the solution of the nonlinear equation is sought in the same form as the solution of a second-order differential equation, provided the smallest root of the characteristic equation

$$TVp^3 + (T + V)p^2 + p + Ch(A) = 0 \tag{8}$$

greatly differs from the other roots. Substituting  $p = u + i\omega$ , one obtains

$$x = TVu^3 - 3TVu\omega^2 + (T + V)u^2 - (T + V)\omega^2 + u + Ch(A) = 0 \tag{9}$$

and

$$Y = 3TVu^3\omega - TV\omega^3 + 2(T + V)u\omega + \omega = 0 \tag{10}$$

From Eq. (10) one finds  $\omega^2$  and substitutes it in Eq. (9), whose right-hand side becomes

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$$8TVu^3 + 8(T + V)u^2 + 2u \left[ 1 + \frac{(T + V)^2}{TV} \right] + \frac{T + V}{TV} = Ch(A) = \frac{Ch(A)h_{cr}h^*}{h_{cr}h^*} = \frac{Ch(A)h^*}{h_{cr}H^*} \quad (11)$$

where  $H^*$  is a dimensionless parameter:

$$H^* = \frac{h^*}{h_{cr}} \quad (12)$$

$h^*$  being the tangens of the inclination of the linearized characteristic,  $h_{cr} = 2S/\pi\eta$  - the maximum value of  $h$ , determined from the

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D299/D305

parameters of the nonlinear characteristic (without the higher harmonics). Eq. (12) is the basic working formula. The dependence of performance on  $H^*$  is determined by means of a generalized performance diagram (shown in a figure). In constructing the diagram, 3 cases are considered (different values for  $u$  and  $\omega$ ). Thus in the first case:

$$u = 0, \omega = \omega_0 = \frac{1}{\sqrt{TV}}, h = h^* = \frac{T + V}{CTV}$$

one obtains

$$H^* = \frac{2h \sqrt{A^2 - \eta^2}}{A^2} \quad (13)$$

$$A^2 = \frac{M}{2} \pm \sqrt{\frac{M^2}{4} - M\eta^2} \quad (14)$$

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where

$$M = \left( \frac{4S}{\pi h^2} \right)^2$$

The obtained working formulas, in conjunction with the diagrams, permit determining the limits of stability and of the transient processes. A comparison of the working formulas with the curve based on the exact formulas shows that the working formulas can be used in practice, provided the system has filter property and the minimum root greatly differs from the other roots. If this is not the case, i.e. the roots are multiple or commensurate, they have to be taken into account. The construction of the transient processes, taking into account the 3 roots of the characteristic equation, is shown in diagrams. A numerical example illustrates the use of the first method. On the second approximate method, the so-

lution to Eq.(5) is taken in the form:  $x = x_1 + x_2 + x_3 = C_1 e^{p_1 t} +$

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+  $C_2 l^{p_2 t}$  +  $C_3 l^{p_3 t}$ . Stability and performance are studied on an equivalent system, by linearizing the nonlinear characteristic  $F$ . Thereupon, the usual criteria (Hurwitz's, etc.) for linear systems are used. A numerical example is given. The 2 approximate methods can be applied provided: a) the system has filter property and the minimum root is incommensurable with the others, or b) only one condition holds - that of the filter. An estimate of the accuracy of the methods, carried out by exact mathematical investigations as well as by experimental studies, proved their practical feasibility. A third method, based on rough working formulas, involves determining the stability limits by describing function analysis, and the limits of the monotonous transient processes by exact methods. There are 5 figures and 8 Soviet-bloc references.

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