fusion technology

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ALPHA PARTICLES IN FUSION RESEARCH

CURRENT PHYSICS ISSUES OF FUSION-PRODUCED ALPHA PARTICLES

Ya. I. Kolesnichenko

Ya. I. Kolesnichenko [D.Sci., physics, Kiev Institute for Nuclear Research (KINR) of the Ukrainian SSR Academy of Sciences, USSR, 1978] is head of KINR's Division of Theory on Future Nuclear Power Development. His current research interests include alpha-particle physics and current drive in tokamaks.

A NUMERICALLY DERIVED DIFFUSION COEFFICIENT FOR FAST ALPHA TRANSPORT IN A TOKAMAK REACTOR WITH A MAGNETIC RIPPLE

Ezio Bittoni
Marcel Haegi

Ezio Bittoni (top) (MS, physics, University of Bologna, Italy, 1963) has been a principal scientist at ENEA since 1963. He has been involved in the computational aspects of neutron blankets in nuclear reactors and numerical simulation of fluid dynamics and plasma physics problems, with a particular emphasis on impurity transport and alpha-particle containment in toroidal machines. **Marcel Haegi** (PhD, physics, University of Geneva, Switzerland, 1968) is a principal scientist at the Euratom-ENEA Fusion Laboratory in Frascati. His research interests include plasma physics, alpha-particle transport and containment, and their application to thermonuclear fusion reactors.

ALPHA-PARTICLE TRANSPORT STUDIES USING A MODIFIED FOKKER-PLANCK EQUATION AND SEMIEMPIRICAL TRANSPORT LAWS

Gerald Kamelander

Gerald Kamelander (PhD, theoretical physics, Technical University of Vienna, 1969) is working at the Austrian Research Center Seibersdorf and teaching plasma physics as an assistant professor at the Technical University of Vienna. His main fields of interest include nuclear physics, transport theory, and plasma physics. He is currently involved with fusion alpha-particle transport problems in predictive codes.

ORBIT-AVERAGED DRIFT KINETIC EQUATION FOR THE STUDY OF ALPHA-PARTICLE TRANSPORT IN TOKAMAKS

Glenn T. Sager
George H. Miley
Keith H. Burrell

Glenn T. Sager (top) (BS, mathematics, San Diego State University, 1983; MS, nuclear engineering, University of Illinois) is a PhD candidate at the University of Illinois, on assignment at General Atomics. His current interests include plasma transport, kinetic modification of plasma stability, optimization, and control theory. **George H. Miley** (center) (PhD, University of Michigan, 1958) is a professor in the Department of Nuclear Engineering at the University of Illinois. In addition to research on fusion, he is well known for his research on energy conversion and nuclear-pumped lasers. **Keith H. Burrell** (bottom) (BS, Stanford University, 1968; MS, 1970, and PhD, 1974, California Institute of Technology) is a senior technical advisor at General Atomics in the D III-D physics group. He has worked primarily on experimental investigations of transport in tokamak plasmas, including impurity, energy, and angular momentum transport studies. He has also done theoretical calculations of impurity and angular momentum transport in tokamak plasmas. At present, he is in charge of transport studies and charge-exchange recombination spectroscopy measurements on D III-D.

NUMERICAL SIMULATION OF FAST ION ORBITS IN A TOKAMAK IN THE PRESENCE OF STATIC HELICAL PERTURBATIONS

Sergey V. Konovalov
Sergey V. Putvinsky

Photographs and biographies for **Sergey V. Konovalov** and **Sergey V. Putvinsky** were not available at publication time.

MODEL DESCRIPTION OF ALPHA-PARTICLE STOCHASTIC LOSSES IN A TOROIDAL PLASMA

S. V. Bulanov
L. M. Kovrizhnykh
S. G. Shasharina

S. V. Bulanov (top) (general and applied physics, Moscow Physical and Technical Institute, USSR) is head of the Division of Nonlinear Phenomena Theory of the plasma physics department of the General Physics Institute. **L. M. Kovrizhnykh** (center) (physics, Moscow State University, USSR) is head of the plasma physics department of the General Physics Institute. **S. G. Shasharina** (bottom) (physics, Moscow State University, USSR) is a research scientist in the plasma physics department of the General Physics Institute. She is currently at the University of Colorado at Boulder.

EFFECT OF MAGNETIC FIELD DISTORTION ON ALPHA-PARTICLE LOSSES IN STELLARATORS

V. P. Nagornyj

No photograph or biography for **V. P. Nagornyj** was available at publication time.

KINETIC EQUATION FOR HIGH-ENERGY PARTICLES OF AXISYMMETRIC TOKAMAKS IN TERMS OF CONSTANTS OF MOTION

V. Ya. Goloborod'ko
V. A. Yavorskij

A photograph and biography for **V. Ya. Goloborod'ko** were not available at publication time. The photograph and biography of **V. A. Yavorskij** are presented below.

KINETIC APPROACH TO THE HELIUM TRANSPORT IN A DIVERTOR PLASMA ALONG THE MAGNETIC FIELD

Sergei I. Krasheninnikov
Tatyana K. Soboleva
K. Gac

Sergei I. Krasheninnikov (top) (Moscow Physical Technical Institute, USSR, 1976; Candidate of Science, Kurchatov Institute of Atomic Energy, USSR, 1979) has worked in plasma physics theory and its applications to tokamaks. His current interests are in the field of the divertor plasma behavior. He is also a member of the ITER research staff. **Tatyana K. Soboleva** (bottom) (Leningrad Electrical Engineering Institute, USSR, 1966; Candidate of Science, Kurchatov Institute of Atomic Energy, USSR, 1973) has worked on development and application of computational models for plasma physics. Her current interests are in the area of stochastic modeling of charged-particle kinetics as applied to tokamaks. No photograph or biography is available for **K. Gac**.

RIPPLE-INDUCED TRANSPORT PROCESSES OF FAST ALPHA PARTICLES AND ALPHA WALL LOAD IN ITER-LIKE REACTORS

V. Ya. Goloborod'ko
Ya. I. Kolesnichenko
V. V. Lutsenko
S. N. Reznik
V. A. Yavorskij

No photograph or biography is available for **V. Ya. Goloborod'ko**. **Ya. I. Kolesnichenko** (top right) [D.Sci., physics, Kiev Institute for Nuclear Research (KINR) of the Ukrainian SSR Academy of Sciences, USSR, 1978] is head of KINR's Division of Theory on Future Nuclear Power Development. His current research interests include alpha-particle physics and current drive in tokamaks. **V. V. Lutsenko** (top left) (MS, physics, Kiev University, USSR, 1987) is a junior scientist in the Division of the Theory on Future Nuclear Power Development of KINR. He is currently working for his PhD on thermonuclear burn and noninductive current drive in tokamaks. **S. N. Reznik** (bottom right) (D.Sci., physics, KINR, USSR, 1979) is a senior scientist in the Division of Theory on Future Nuclear Power Development at KINR. His current research interests include stability of thermonuclear burn and current drive in tokamaks. **V. A. Yavorskij** (bottom left) (D.Sci., physics, KINR, USSR, 1979) is a senior scientist in KINR's Division of Theory on Future Nuclear Power Development. His research areas include transport in toroidal systems and alpha-particle physics.

THERMONUCLEAR CONE ALFVÉN INSTABILITY IN TOKAMAK REACTORS

V. S. Belikov

V. S. Belikov [D.Sci., physics, Kiev Institute for Nuclear Research (KINR) of the Ukrainian SSR Academy of Sciences, USSR, 1975] is a senior scientist in KINR's Division of Theory on Future Nuclear Power Development. His current research interests include alpha-particle physics in fusion reactors. He is also working on the radio-frequency current drive and heating of toroidal plasmas.

ALPHA-PARTICLE EFFECTS ON LOW-*n* MAGNETOHYDRODYNAMIC MODES

C. Z. Cheng

C. Z. Cheng (BS, physics, National Cheng-Kung University, Taiwan, 1969; MS, 1972, and PhD, 1975, physics, University of Iowa) has been a physicist at the Princeton Plasma Physics Laboratory since 1975. He has worked primarily in theoretical and computational plasma physics with applications in magnetic fusion research and space physics.

THERMAL INSTABILITY OF THERMONUCLEAR PLASMA IN A MIRROR FIELD

Nobuo Mizuno

Nobuo Mizuno (BS, 1978; MS, 1980; and DS, 1983; physics, Nihon University, Japan) is currently a research associate at College of Science and Technology, Nihon University. His research interests include alpha-particle confinement and thermonuclear instability in mirror reactors.

THERMONUCLEAR INSTABILITY OF GLOBAL-TYPE SHEAR ALFVÉN MODES

James W. Van Dam
Guo-Yong Fu
C. Z. Cheng

James W. Van Dam (top) (PhD, physics, University of California–Los Angeles, 1979) is a research scientist and the assistant director of the Institute for Fusion Studies (IFS) at the University of Texas–Austin. His interests include kinetic theory, magnetohydrodynamics, plasma waves, and equilibrium and stability in toroidal confinement devices. **Guo-Yong Fu** (center) (BS, physics, China University of Science and Technology, 1983) is a research assistant and doctoral candidate in the IFS. His thesis work concerns transport limitations on access to ballooning-mode second stability in tokamaks with auxiliary heating, as well as alpha-particle effects on Alfvén waves in ignition plasmas. **C. Z. Cheng** (bottom) (BS, physics, National Cheng-Kung University, Taiwan, 1969; MS, 1972, and PhD, 1975, physics, University of Iowa) has been a physicist at the Princeton University Plasma Physics Laboratory since 1975. He has worked primarily in theoretical and computational plasma physics with applications in magnetic fusion research and space physics.

ALPHA-PARTICLE EFFECTS ON BALLOONING FLUTE MODES IN TOKAMAKS

Zh. N. Andrushchenko
A. Ya. Bojko
O. K. Cheremnykh

Photographs and biographies for **Zh. N. Andrushchenko, A. Ya. Bojko**, and **O. K. Cheremnykh** were not available at publication time.

ABSORPTION OF FAST MAGNETOSONIC WAVES BY ALPHA PARTICLES IN TOKAMAK PLASMAS

T. D. Kaladze
K. N. Stepanov

Photographs and biographies for **T. D. Kaladze** and **K. N. Stepanov** were not available at publication time.

DESTABILIZATION OF TOKAMAK PRESSURE-GRADIENT DRIVEN INSTABILITIES BY ENERGETIC ALPHA-PARTICLE POPULATIONS

Donald A. Spong
Jeff A. Holmes
Jean-N. Leboeuf
Peggy Jo Christenson

Donald A. Spong (top) (BS, nuclear engineering, University of Arizona, 1970; PhD, nuclear engineering, University of Michigan, 1976) is a research staff member in the Theory Section of the Fusion Energy Division at Oak Ridge National Laboratory (ORNL). He has been with ORNL about 14 years and has worked in the areas of runaway electron physics in tokamaks, neoclassical transport, and hot electron stability in the Elmo Bumpy Torus device, alpha physics in tokamak reactors, and kinetic effects on toroidal stability. His more recent work has specifically been in the areas of the effects of alpha-particle populations on tokamak ballooning stability and an analysis of neoclassical magnetohydrodynamic (MHD) pressure-gradient driven instabilities. **Jeff. A. Holmes** (center) (PhD, physics, California Institute of Technology, 1976) is a computational physicist in the Computer Sciences Division at ORNL. He is a member of the MHD group with experience in equilibrium, stability, and resistive MHD calculations applied to tokamaks, stellarators, and reversed-field pinch devices. **Jean-N. Leboeuf** (bottom) (PhD, Institut National de la Recherche, Quebec, Canada, 1976) is a research staff member in the Fusion Energy Division of ORNL. His research interests include computational plasma physics and plasma turbulence. **Peggy Jo Christenson** (no photograph available) (BS, nuclear engineering, University of Arizona, 1988) is a graduate student in nuclear engineering at the University of Michigan. She spent a summer working in the Fusion Theory Section at ORNL during the practicum period of a U.S. Department of Energy Magnetic Fusion Energy Fusion Technology Fellowship.

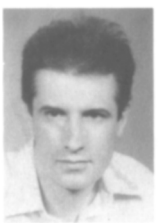
COLD FUSION

INVESTIGATIONS OF THE DEUTERIUM-DEUTERIUM FUSION REACTION IN CAST, ANNEALED, AND COLD-ROLLED PALLADIUM

Radomir Ilić
Jože Rant
Tomaž Šutej
Mirko Doberšek
Edvard Krištof
Jure Skvarč
Matjaž Koželj

Radomir Ilić (top) (Dipl. Ing., 1971; MS, 1978; and Dr. Sc., 1984; metallurgy, University of Ljubljana, Yugoslavia) is a senior research associate at the J. Stefan Institute and assistant professor of the faculty of natural sciences and technology, University of Ljubljana. In 1979–1980, 1980, and 1988, he was with the University of Illinois; Kernforschungszentrum Karlsruhe, Federal Republic of Germany (FRG); and the Reactor Fuel Fabrication Plant, Hanau, FRG, respectively, as a fellow of the International Atomic Energy Agency. He has been involved in the development of nuclear imaging methods utilizing solid-state nuclear track detectors and their application to material science and nuclear technology. His current interests are fusion diagnostics, radon dosimetry, and light elements in solids. **Jože Rant** (center) (Dipl. Ing., physics; MSc, nuclear physics, 1974, and Dr. Sc., mechanical engineering, University of Ljubljana, Yugoslavia) is a senior research associate at the J. Stefan Institute. In 1974 he was with Oak Ridge National Laboratory as a fellow of International Atomic Energy Agency. His past activities have included fast neutron spectroscopy, neutron radiography, and nuclear fuel. His current interests are nuclear nondestructive techniques and dosimetry in nuclear fusion. **Tomaž Šutej** (bottom) (Dipl. Ing.,

physics, University of Ljubljana, Yugoslavia, 1984; MS, nuclear engineering, University of Maribor, Yugoslavia, 1988) is a research assistant at the J. Stefan Institute. His current interests include research in solid-state nuclear track detectors and their application to radon monitoring and neutron dosimetry. **Mirko Doberšek** (top right) (Dipl. Ing., 1971; MS, 1979; and Dr. Sc., 1986; metallurgy, University of Ljubljana, Yugoslavia) is head of the Research Division of Gold Factory, Celje, and assistant professor of the faculty of natural sciences and technology, University of Ljubljana. His main interests are the constitution of alloy systems and development of new alloys. He is currently interested in the influence of thermomechanical conditions on physicochemical characteristics of alloys made of noble metals for jewelry, dental alloys, and special alloys for electronics. **Edvard Krištof** (top left) (Dipl. Ing., physics, University of Ljubljana, Yugoslavia, 1970) is a professional fellow at the J. Stefan Institute. His main interest has been in the development of nondestructive methods for assessment of nuclear fuel and neutron scattering. He is currently engaged in ion cluster beam epitaxy. **Jure Skvarč** (bottom right) (Dipl. Ing., physics, University of Ljubljana, Yugoslavia, 1989) is a research assistant at the J. Stefan Institute and a graduate student in physics at the University of Ljubljana. His interests are the development of automatic systems for the evaluation of solid-state nuclear track detectors and computational physics. **Matjaž Koželj** (bottom left) (Dipl. Ing., physics, University of Ljubljana, Yugoslavia, 1979) is a professional fellow at the J. Stefan Institute. From 1980 to 1986, he was with the faculty for natural sciences and technology of the University of Ljubljana and from 1986 to 1989 with the Microelectronics Division of ISKRA. His past experience includes the development of research methods and instrumentation in microelectronics and vacuum technology. His current interest is ion cluster beam epitaxy.



INTERMITTENCY, IRREPRODUCIBILITY, AND THE MAIN PHYSICAL EFFECTS IN COLD FUSION

Peter H. Handel

Peter H. Handel (MS, atomic and theoretical physics; PhD, solid-state theory, Bucharest, Romania, 1965) was a scientist at the Institute of Physics of the Romanian Academy (1960–1967), a scientist at the Laue-Langevin Institute (1967–1969), and has been a professor of physics at the University of Missouri–St. Louis since 1969. He is best known for the quantum theory of $1/f$ noise (1975) and for the infrared divergence effect of $1/f$ fluctuations in physical cross sections and process rates. He is also known for his polarization-catastrophe theory of atmospheric electricity and many other contributions to solid-state, plasma, and noise theory.

A PROPOSAL FOR A LUKEWARM NUCLEAR FUSION

Günter Nimtz
Peter Marquardt

Günter Nimtz (top) has been a professor in the physics department of the University of Cologne, Federal Republic of Germany (FRG), since 1978. His research activities include the fields of semiconductors, microwave spectroscopy, and dielectric properties of mesoscopic systems. **Peter Marquardt** (BS, 1973, and PhD, 1976, physics, Cologne University, FRG) has held postdoctoral positions at Kernforschungsanlage Jülich and the University of Saarbrucken. His research activities include the physics of thin films, nano-crystals and -droplets, and other mesoscopic structures.

ELECTROCHEMICALLY INDUCED NUCLEAR FUSION OF DEUTERIUM: THE EXISTENCE OF NEGATIVELY CHARGED DEUTERIDE IONS

Jacob Jorne

Jacob Jorne (BS, 1963, and MS, 1967, Technion–Israel Institute of Technology; PhD, chemical engineering, University of California–Berkeley, 1972) is a professor of chemical engineering at the University of Rochester. His research interests include electrochemical engineering, semiconductor processing, energy conversion and storage, and the theoretical biology of ecosystems.