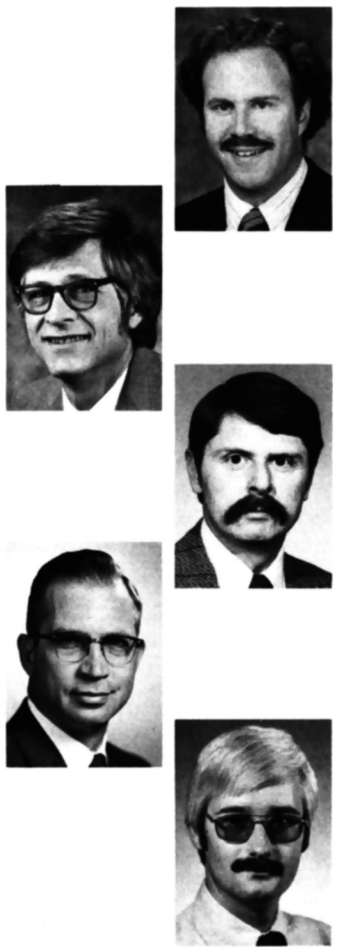
nuclear technology/Fusion

AUTHORS — JULY 1981

OVERVIEW

AN OVERVIEW OF INERTIAL FUSION REACTOR DESIGN

M. J. Monsler
J. Hovingh
D. L. Cook
T. G. Frank
G. A. Moses



Michael J. Monsler (top right) [PhD, physics of fluids, Massachusetts Institute of Technology (MIT), 1969] heads the Energy and Military Applications Group, Laser Fusion Program, Lawrence Livermore National Laboratory (LLNL). His research interests include inertial fusion design and engineering, laser systems analysis, and economics of energy conversion systems. He has previously worked in laser systems analysis at Science Applications, Inc., and in fluid physics at Avco Everett Research Laboratory. **Jack Hovingh** (top left) (BSE, mechanical engineering, and BSE, mathematics, University of Michigan, 1958; MS, engineering science, University of California-Berkeley, 1973) is a research engineer in the Energy and Military Applications Group of the Laser Fusion Program at LLNL. He has been involved in the conceptual design of fusion reactors for the past eight years. His current technical interests include the mathematical modeling of physical phenomena in inertial confinement fusion (ICF) reactors. **Donald L. Cook** (center right) (PhD, nuclear engineering, MIT, 1976) was a staff member at the Francis Bitter National Magnet Laboratory and the Plasma Fusion Center, MIT, in 1976 and 1977, where he worked on high-field tokamak reactor design. Since that time, he has worked in the Particle Beam Fusion Group at Sandia National Laboratories on conceptual reactor and advanced facility designs and is currently supervisor of the Pulsed Power Engineering Division. **Thurman G. Frank** (bottom left) (PhD, applied mathematics, University of Texas) is group leader of the Defense Technology Group at the Los Alamos National Laboratory, where he has been employed for most of his career. He has been involved in a diversity of nuclear programs since 1950, including nuclear weapons, space nuclear power supplies, commercial reactor design, and inertial fusion. **Gregory A. Moses** (bottom right) (PhD, nuclear engineering, The University of Michigan, 1976) is an associate professor of nuclear engineering at the University of Wisconsin. His research interests include ICF reactor technology, radiation hydrodynamics, and transport theory. He worked for two summers at LLNL and in recent years has been a visiting staff member with the target design group at the Los Alamos National Laboratory.

TECHNOLOGY REQUIREMENTS FOR COMMERCIAL APPLICATIONS OF INERTIAL CONFINEMENT FUSION

T. G. Frank
C. E. Rossi

Thurman G. Frank (top) (PhD, applied mathematics, University of Texas) is group leader of the Defense Technology Group at the Los Alamos National Laboratory, where he has been employed for most of his career. He has been involved in a diversity of nuclear programs since 1950, including nuclear weapons, space nuclear power supplies, commercial reactor design, and inertial fusion. **Charles E. Rossi** (BA, engineering sciences and applied physics, and ME and PhD, applied physics, Harvard University) is currently with the U.S. Nuclear Regulatory Commission. At the time this paper was written, he was Systems and Civilian Applications Program Manager in the U.S. Department of Energy's Office of Inertial Confinement Fusion. From 1958 to 1962, he served as a naval officer assigned to Naval Reactors, Division of Reactor Development in the U.S. Atomic Energy Commission. From 1966 to 1977, Rossi was employed by Westinghouse Electric Corporation, Nuclear Energy Systems, where he held technical and management positions involving pressurized water reactor systems transient analysis.

ICF

CAVITY GAS ANALYSIS FOR LIGHT-ION-BEAM FUSION REACTORS

Robert R. Peterson
Gregory A. Moses
Gary W. Cooper

Robert R. Peterson (top) (PhD, physics, University of Illinois, 1978) has been on the research staff in nuclear engineering at the University of Wisconsin (UW) since 1978. His primary research interests are in radiative transfer and atomic physics. **Gregory A. Moses** (center) (PhD, nuclear engineering, University of Michigan, 1976) is an associate professor of nuclear engineering at the UW. His research interests include inertial confinement fusion reactor technology, radiation hydrodynamics, and transport theory. He worked for two summers at the Lawrence Livermore National Laboratory, and in recent years has been a visiting staff member with the target design group at the Los Alamos National Laboratory. **Gary W. Cooper** (bottom) (PhD, nuclear engineering, University of Illinois, 1976) has been an assistant professor in chemical and nuclear engineering at the University of New Mexico since 1979. His present research interests include fusion reactor conceptual design studies, laser physics, and plasma chemistry.

PLASMA BEHAVIOR IN MAGNETICALLY PROTECTED INERTIAL CONFINEMENT FUSION REACTOR CAVITIES

I. O. Bohachevsky
J. C. Goldstein
D. O. Dickman

Ihor O. Bohachevsky (right) (BAE magna cum laude, 1956, and PhD, applied mathematics, 1961, New York University) is a staff member in the Systems, Analysis and Assessment Division of the Los Alamos National Laboratory (LANL). Current work is in the area of inertial confinement fusion (ICF) systems and applications studies with particular emphasis on the identification and solution of technical problems associated with the

commercialization of fusion energy. Previous work was in the areas of fluid mechanics, numerical analysis, magnetohydrodynamics, and mathematical modeling. **John C. Goldstein** (top) (PhD, Massachusetts Institute of Technology, 1971) is a staff member in the Laser Fusion Theory Group of the Theoretical Design Division of LANL. Current interest in problems of ICF reactor cavity plasma phenomena complements his continuing work in laser theory, particularly problems associated with the generation and propagation of short pulses in molecular lasers. **Donald O. Dickman** (bottom) (BS, mathematics and physics), staff member in Design Engineering Division of LANL, specializes in the development of large computer codes and computer graphics for various applications in energy-related areas, such as ICF, laser pulse propagation, and ventilation. His previous work was in nuclear weapons effects simulation.

ADVANCED LASERS

DYNAMICS OF THE NUCLEAR AND ELECTRICALLY PUMPED 1.45-μm ATOMIC CARBON LASER IN MIXTURES OF HELIUM + CO AND HELIUM + CO_2

M. A. Prelas
G. H. Miley

M. A. Prelas (top) (PhD, nuclear engineering, University of Illinois, 1979) is an assistant professor of nuclear engineering at the University of Missouri-Columbia (UMC). He joined the UMC faculty after completing his PhD on a direct energy conversion technique (nuclear pumped lasers). His research interests are in the areas of direct energy conversion, gaseous electronics, and plasma engineering. **George H. Miley** (PhD, University of Michigan, 1958) is professor and chairman of the Nuclear Engineering Program at the University of Illinois in Urbana-Champaign. In addition to research on nuclear pumped lasers, he is well known for his research on energy conversion and fusion.