ENS nuclear technology/Fusion

AUTHORS — JANUARY 1983

OVERVIEW

DESIGN DESCRIPTION OF THE FUSION ENGINEERING DEVICE

Don Steiner
Charles A. Flanagan

Don Steiner (top) (BS, chemical engineering, 1960; MS, nuclear engineering, 1962; PhD, nuclear engineering, 1967, Massachusetts Institute of Technology) is professor of nuclear engineering at Rensselaer Polytechnic Institute. Since 1968 he has been involved in fusion power systems analysis and design. From 1978 to 1982 he was manager of the Fusion Engineering Design Center (FEDC) at Oak Ridge National Laboratory (ORNL). **Charles A. Flanagan** (BS, physics, Lafayette College, 1953; MBA, University of Pittsburgh, 1972) is project manager at the FEDC at ORNL. He has 20 years of fission reactor design and nuclear engineering experience in naval reactor and commercial reactor programs and 6 years of fusion experience in both magnetic and inertial confinement programs.

ON THE ROLE OF FUSION-FISSION HYBRIDS IN THE NUCLEAR FUTURE OF THE UNITED STATES AND THE WESTERN WORLD

S. I. Abdel-Khalik

S. I. Abdel-Khalik [PhD, mechanical engineering, University of Wisconsin-Madison (UW), 1973] is a professor of nuclear engineering at UW. He joined the UW faculty in 1976 after two years of postdoctoral work in chemical engineering and one year with the nuclear industry. His current research interests are in the areas of reactor safety and fusion technology.

SCOPING OF OIL SHALE RETORTING WITH NUCLEAR FUSION REACTORS

Terry R. Galloway

Terry R. Galloway (BS, chemical engineering, University of California, Berkeley; MS and PhD, chemical engineering, fluid mechanics and transport phenomena, California Institute of Technology) worked for Shell Development Company's Emeryville Research Center from 1967 to 1975. In 1975 he joined the University of California and became head of a new division at Lawrence Livermore National Laboratory that specialized in energy conversion. He is currently serving as director of Mittelhauser Corporation, a chemical engineering company, and is manager of its Advanced Energy Conversion Division.

FUSION REACTORS

THE OHTE REACTOR CONCEPT

Teruo Tamano

Teruo Tamano (BS, 1961; MS, 1963; and PhD, 1966, physics, University of Tokyo) is manager of the Ohmically Heated Toroidal Experiment Program at General Atomic where he has worked since 1970. Prior to that he was a research associate at the University of Tokyo and did postdoctoral work at the Princeton Plasma Physics Laboratory. His current interests include helically symmetric toroidal pinch and reversed field pinch experiments.

ENERGY STORAGE, SWITCHING, AND CONVERSION

TEST RESULTS ON PLASMA DIRECT CONVERTERS

William L. Barr
Ralph W. Moir

William L. Barr (top) (PhD, physics, University of California at Berkeley, 1957) is a member of the Advanced Mirror Systems (Fusion) Group at Lawrence Livermore National Laboratory (LLNL), and is presently analyzing the end plasma and direct energy recovery for the Mirror Advanced Reactor Study. He has developed and tested plasma direct energy converters (for mirror end-loss plasma) and beam direct converters (for the ions from neutral beam injectors). **Ralph W. Moir** (ScD, nuclear engineering, Massachusetts Institute of Technology, 1967) worked in 1967 and 1968 on the magnetic fusion project at Fontenay-aux-Roses, France (Centre d'Etude de l'Energie Nucléaire-Commissariat à l'Energie Atomique). In 1968, he joined LLNL, where he has specialized in development of the direct conversion of fusion plasma energy to electrical energy and reactor design. At present, he is head of the fusion-fission hybrid reactor design study project and serves as associate program leader for advanced mirror systems.

TRITIUM SYSTEMS

A MATHEMATICAL SIMULATION PROCEDURE FOR A MULTISTAGE-TYPE WATER/HYDROGEN EXCHANGE COLUMN IN TRITIUM SYSTEM

Masahiro Kinoshita
Yuji Naruse

Masahiro Kinoshita (top) (MS, chemical engineering, Kyoto University, 1979) is a research engineer at the Tritium Engineering Laboratory of the Division of Thermonuclear Fusion Research at the Japan Atomic Energy Research Institute (JAERI). His current work is on the development of mathematical simulation models and computer codes for the equilibrium stage processes in the fuel cycle system for fusion reactors, such as cryogenic distillation columns, falling liquid film condensers, water/hydrogen exchange columns, water distillation columns, and multicomponent separating cascades. **Yuji Naruse** (BS, chemical engineering, Kyoto University, 1959) is the chief of the Tritium Engineering Laboratory at JAERI. He has been engaged in engineering works related to uranium enrichment by the porous membrane method. He is now involved with the design work of tritium facilities.

EXPERIMENTAL DEVICES

MULTI-MeV Li° BEAM AS A DIAGNOSTIC FOR FAST CONFINED ALPHA PARTICLES

Larry R. Grisham
Douglass E. Post
David R. Mikkelsen



Larry R. Grisham (top) (PhD, physics, Oxford University) has been a physicist at the Princeton Plasma Physics Laboratory (PPPL) since 1974. He has worked mainly in the application and development of neutral beam heating for magnetically confined plasmas. **Douglass E. Post** (center) (PhD, physics, Stanford University) has been a physicist at the PPPL since 1975. He has worked primarily in the computational modeling of tokamaks and the application of atomic processes to fusion research. **David R. Mikkelsen** (bottom) (PhD, physics, University of Washington) has been a physicist at the PPPL since 1977. He has developed computational models of neutral beam injection and fast ion orbits in tokamaks.

BLANKET ENGINEERING

PRELIMINARY NEUTRONIC CALCULATIONS FOR FUSION BLANKET TESTING IN THE ENGINEERING TEST REACTOR

A. Jerry Scott
Daniel E. Wessol
Jerry L. Judd



A. Jerry Scott (top) (BS, physics, Brigham Young University, 1960) is supervisor of the Reactor Analysis Section for EG&G Idaho, Inc., at the Idaho National Engineering Laboratory (INEL). He began work in core physics analysis and design at INEL in 1962 after two previous years at Lawrence Livermore National Laboratory. Current interests are in fusion reactor neutronics and core physics. **Daniel E. Wessol** (center) (BS, physics, Pennsylvania State University, 1967; MS, nuclear engineering, Carnegie Mellon University and University of Idaho, 1978) has worked at the Bettis Atomic Power Laboratory in the analysis and kinetics section of the light water breeder reactor project. He is currently assigned to EG&G Idaho, Inc., Test Reactor Special Project Group at INEL. His professional interests include core physics, Monte Carlo code development, and small computer applications. **Jerry L. Judd** (bottom) (BS, nuclear engineering, University of Oklahoma, 1977; MS, nuclear engineering, University of Idaho, 1982) began work in fission reactor core physics at the INEL in 1977. Current interests include core physics and fusion reactor neutronics.

MAGNET SYSTEMS

MAGNETIC FIELD ERRORS IN QUADRUPOLE TANDEM MIRRORS

E. B. Hooper, Jr.

E.B. (Bickford) Hooper, Jr. (BS, physics, 1959, and PhD, physics, Massachusetts Institute of Technology) is a physicist in the Magnetic Fusion Energy (MFE) Division at Lawrence Livermore National Laboratory (LLNL). He is presently working on the experimental plasma physics of tandem mirrors (TMX-U experiment) and on the physics and design of advanced

tandem mirrors. He has worked on a variety of topics in plasma physics and magnetic fusion including low frequency instabilities, confinement and heating of toroidal plasmas, diagnostics, and intense negative ion beams. He spent a postdoctoral year at the Royal Institute of Technology (Sweden), has been employed as assistant professor of applied science at Yale University, and has taught graduate physics courses at the University of California, Davis, Livermore Extension.

PLASMA ENGINEERING

ANOMALOUS CORRELATION AND DIFFUSION IN MICROFIELDS OF MAGNETOACTIVE PLASMAS

Horst E. Wilhelm

Horst E. Wilhelm (BS, 1956; MS, 1959; and PhD, 1962, engineering physics, Universities of Stuttgart and Munich) is a senior research physicist with the Naval Weapons Center, China Lake, California. From 1963 to 1965, he was a research physicist with the Allison Division of General Motors Corporation. He was assistant professor of nuclear engineering from 1965 to 1968 and professor of engineering sciences from 1978 to 1980 at the University of Florida. From 1968 to 1978, he was professor of mechanical and electrical engineering and physics at Colorado State University.

ICF CHAMBER ENGINEERING

FATIGUE CRACK GROWTH IN INERTIAL CONFINEMENT FUSION REACTION CHAMBER COMPONENTS

John H. Pitts

John H. Pitts (BS, mechanical engineering, Stanford University, 1955; MS, University of California, Berkeley, 1959; PhD, University of California, Davis, 1976) has conducted research on fluid dynamics, heat transfer, nuclear reactor safety, and inertial confinement fusion at the Lawrence Livermore National Laboratory (LLNL) since 1959. From 1978 to 1979, he was on professional research leave at Gesellschaft für Reaktorsicherheit mbH, Garching, Federal Republic of Germany. He is presently a senior staff mechanical engineer in the Energy Systems Engineering Division of the LLNL Laser Program working on conceptual designs for producing electrical power using inertial confinement fusion.