

TO: Executive Secretaries of the US-Japan Fusion Research Collaboration
FROM: JIFT Steering Committee
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SUBJECT: JIFT Annual Report of Activities for 1999-2000

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Annual Report of JIFT Activities
Attachments

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Annual Report of Activities

US-Japan Joint Institute for Fusion Theory

April 1, 1999–March 31, 2000

JIFT Steering Committee

Co-Chairmen: Richard D. Hazeltine and Tetsuya Sato

Co-Executive Secretaries: Masao Okamoto and James W. Van Dam

March 10, 2000

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1. Introduction

The Joint Institute for Fusion Theory (JIFT) is one of the three programs through which the US-Japan Fusion Research Collaboration is organized. The other two programs are the Fusion Physics Planning Committee (FPPC) and the Fusion Technology Planning Committee (FTPC).

The distinctive objectives of the JIFT program are: (1) to advance the theoretical understanding of plasmas, with special emphasis on stability, equilibrium, heating, and transport in magnetic fusion systems; and (2) to develop fundamental theoretical and computational tools and concepts for understanding nonlinear plasma phenomena. Both objectives are pursued through collaborations between U.S. and Japanese scientists, by means of various types of exchange program activities—namely, workshops, exchange visitors, and joint computational projects.

At present the JIFT program each year usually consists of approximately four topical workshops (two in each country), six exchange scientists (three from each country), and a fluctuating number of joint computational projects (on the order of a dozen). So far, during its 19 years of successful operation, JIFT has sponsored 114 long-term visits by exchange scientists, 71 topical workshops, and 111 joint computational projects.

The *workshops* typically have an attendance of 25–35 participants, of whom usually three to seven scientists (depending on the particular workshop) travel to the workshop from the non-host country. Scientists from countries other than the U.S. and Japan are also often invited to participate in JIFT workshops, either as “observers” or multi-laterals.

Of the approximately three *exchange visitors* in each direction every year, one (called the “JIFT Visiting Professor”) is supported by the host country, while the others (called “Exchange Scientists”) are supported by the sending country. The visits of the Exchange Scientists usually last from several weeks to a month or two in duration, whereas the Visiting Professors normally stay for at least three months.

The third category of JIFT exchange activities consists of *joint computational projects*. In general these are continuing collaborations on various problems of current interest, which initially develop out of interactions at workshops and through individual exchange visits.

The topics and also the participating scientists for the JIFT exchange visits, workshops, and joint computational projects are selected so as to have a balanced representation of critical issues in magnetic fusion research, including both fundamental problems as well as questions of near-term significance, and also to take into account the specific capabilities and interests of both countries. The Japanese and US members of the JIFT Steering Committee agree together on the appropriateness of proposed topics before recommending them.

A number of general benefits have resulted over the years from the JIFT program. In particular, the following may be cited: JIFT has provided efficient communication channels for the latest theoretical research results, techniques, and directions; JIFT activities have attracted serious participation from allied fields such as fluid turbulence, statistical physics, computational science, and space plasma physics, which brings new scientific tools into the fusion program and enhances the stature of fusion physics; JIFT exchanges have contributed to efficient utilization of international research facilities; and JIFT emphasis on large-scale computational studies has reaped significant mutual benefits from the supercomputer resources and code-building expertise of both countries.

2. Status of Current Activities

The scheduled JIFT activities in all three categories—workshops, personal exchanges, and joint computational projects—were carried. All four workshops were successfully held, in addition to the JIFT Steering Committee meeting. In the category of personal exchanges, two Visiting Professors and four Visiting Scientists made exchange visits. The JIFT joint computational projects were also active.

The JIFT activities for the current fiscal year (April 1, 1999-March 31, 2000) are listed below, with annotations concerning attendance, location, dates, and so forth.

A. 1999-2000 Workshops

US to Japan:

Confinement Theory and Experiment in Toroidal Systems

Organizers: M. Okamoto (NIFS); B. Breizman (IFS)

Held: October 20-22, 1999, NIFS, Toki

Participants: 2 US, 10 Jpn

High Field Science

Organizers: K. Mima (ILE Osaka); T. Tajima (IFS)

Held: October 13-16, 1999, Tokyo Metropolitan U., Tokyo

Participants: 4 US, 10 Jpn

JIFT Steering Committee Meeting

Organizers: M. Okamoto (NIFS); B. Breizman (IFS)

Held: October 11-14, 1999, JAERI, Naka

Participants: 7 Jpn, 3 US

Japan to US:

Simulation Science and Methodology

Organizers: R. Horiuchi (NIFS); B. Cohen (LLNL)

Held: April 27-May 3, 1999, Portland (jointly with International Conference on Numerical Simulations)

Participants: 22 US, 6 Jpn

Physics of High Beta Systems

Organizers: V. Chan (GA), M. Wakatani (Kyoto U.)

Held: September 6-12, 1999, GA Technologies, San Diego

Participants: 23 US, 7 Jpn

B. 1999-2000 Exchange Visits

From Japan to US:

Microinstabilities and Plasma Transport

Hideo Sugama (NIFS), Visiting Professor

Plans to visit IFS, March 25-June 20, 2000

Three Dimensional MHD Stability Analysis of Heliotron Plasmas

Katsuji Ichiguchi (NIFS), Visiting Scientist

Visited U. Wisconsin August 26-October 31 and Science Applications International Corporation, November 1-20, 1999

Theory of Interaction between Ultra-Intense Laser and Plasmas

Toshihiro Taguchi (Setsunan U.), Visiting Scientist

Visited Institute for Plasma Research, U. Maryland, July 31-October 23, 1999

Effects of High-Energy Ions in Heliotron/Torsatron Systems

Noriyoshi Nakajima (NIFS), Visiting Scientist

Visited IFS April 15-28 and attended the TTF Meeting April 29-May 1, 1999

From US to Japan:

Physics of Helical Plasmas and New Concepts

Prashant Valanju (FRC, U. Texas), Visiting Professor

Visited NIFS September 15-December 15, 1999

Study of Kinetic Effects on MHD Phenomena

Boris Breizman (IFS), Visiting Scientist [substituted for H. L. Berk]

Visited JAERI and NIFS October 15-23, 1999

C. 1999-2000 Joint Computational Projects

- JC 1 *MHD Stability in Advanced Tokamaks*
S. Tokuda, Y. Ishii, M. Ozeki (JAERI); J. Manickam (PPPL); A. Aydemir (IFS);
modified from 1998-99.
- JC 2 *Gyrokinetic Transport Simulation*
J. Dawson, V. Decyk, and R. Sydora (UCLA); W. Lee (PPPL); T. Sato and T. Takayama
(NIFS); H. Naitou (Yamaguchi); continued from 1998-99.
- JC 4 *Plasma Rotation, Vortices, and Anomalous Transport*
W. Horton, A. Aydemir (IFS); B. Carreras (ORNL); M. Okamoto, N. Nakajima (NIFS);
M. Wakatani (Kyoto); continued from 1998-99.
- JC 8 *3-D Codes and Island Formation*
D. Monticello (PPPL); A. Boozer (Columbia); C. Hegna (Wisc.); T. Hayashi, R. Kanno
(NIFS); Y. Nakamura (Kyoto U.); continued from 1998-99.
- JC 9 *New Simulation Algorithms for Massively Parallel Processing*
J. Dawson and V. Decyk (UCLA); W. Tang (PPPL); T. Sato, K. Watanabe (NIFS); S.
Ishiguro (NIFS); continued from 1998-99.
- JC 14 *Toroidal Simulation and Plasma Transport Modeling*
T. Tajima and W. Horton (IFS); Y. Kishimoto and M. Azumi (JAERI); continued from
1997-98.
- JC 19 *Numerical Study of High Energy Particle Effect on MHD Stability*
C. Z. Cheng (PPPL); J. Van Dam (IFS); M. Azumi and T. Ozeki (JAERI); continued
from 1998-99.

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- JC 21 *Turbulent Transport Applications to Tokamaks and Helical Systems*
B. Carreras (ORNL); W. Horton (IFS); M. Wakatani, Y. Nakamura (Kyoto); H. Sugama (NIFS); continued from 1998-99.
- JC 22 *Tokamak Simulation on Massively Parallel Computers*
B. Carreras, D. Spong, J.N. Leboeuf (ORNL); J. Dawson, V. Decyk (UCLA); S. Tokuda, G. Kurita, Y. Ishii (JAERI); continued from 1998-99
- JC ___ *MHD and Transport Phenomena in Toroidal Systems*
W. Tang, G. Rewoldt, C.Z. Cheng (PPPL); M. Okamoto, H. Sugama, N. Nakajima (NIFS); new
- JC ___ *Kinetic Effects on MHD Phenomena*
H. Berk, J. Van Dam, B. Breizman (IFS); M. Okamoto, N. Nakajima, K. Ichiguchi (NIFS); new
- JC ___ *Two-Fluid Model for Plasma Simulation*
B. Coppi, T. Takaya, L. Sugiyama (MIT); T. Sato, H. Miura, M. Tanaka (NIFS); new

3. Technical Progress Highlights

The four 1999-2000 JIFT workshops were on topics of timely interest and had stimulating participation by both analytical and numerical theorists, as well as by some experimentalists on occasion.

- The workshop on *Confinement Theory and Experiment in Toroidal Systems* was a successor to the last year's workshop held at NIFS, Toki (Japan). This year this workshop was focused on the theme of the effects of highly energetic particles on MHD stability and transport. Theoretical investigations on the effects of highly energetic ions on heating and transport in the LHD, CHS, and W7-AS toroidal experiments were presented. Also, the experimental results from CHS on burst modes that are similar to fishbone instabilities were presented. Studies on nonlinear bursts of fast particle-driven modes seen in JET, PDX, DIII-D, and TFTR were reported. Much time was allotted to open discussions, mainly concerning the theoretical understanding of the burst modes observed in CHS.
- The workshop on *High Field Science* covered a variety of talks, ranging from strong interactions of high-intensity electromagnetic waves with plasmas, to interactions of RF waves with magnetically confined plasmas. The papers presented at this workshop will be published in a book.
- The workshop on *Simulation Science and Methodology* was held as a satellite workshop of the International Transport Task Force Meeting held in Portland, Oregon. The JIFT workshop was attended by 22 American and 6 Japanese scientists. One of its important purposes was to help develop computer simulations into a science, by means of various types of research on plasma complexity in systems that are nonlinear, non-equilibrium, and open. The importance of visualization techniques, including virtual reality, was emphasized and discussed. Results from PIC particle simulations, gyro-kinetic simulations, gyro-fluid simulations, and two-fluid simulations were presented and compared. A new weighting scheme in the delta-f method was proposed for tracing electron non-adiabatic motion.

- The workshop on *Physics of High Beta Systems* was quite successful. Very recent experimental results from LHD were reported, and the beta limits for the LHD and CHS plasmas were intensively discussed. Physics considerations concerning proposed stellarators in the US were reported. The beta limit and the ratio of the bootstrap current in the spherical tokamak were also timely topics of discussion. Neoclassical tearing modes, which may determine the beta limit in the presence of an internal barrier, were discussed, and detailed investigations of resistive wall modes were presented. Studies were described about the equilibrium and stability--especially the tilt instability--in field-reversed configuration (FRC) plasmas, which is a special configuration with extremely high beta. Reversed-field pinch research was reviewed, and spheromak stability was discussed. As a new trend of divertors, Experiments on a liquid Lithium wall were reported, as a new trend for divertors. In addition, the MHD properties for a plasma surrounded by a liquid Lithium wall were investigated.

The JIFT exchange visits during 1999-2000 have also been productive, in terms of collaborations established, research accomplished, and papers written.

- *Dr. Noriyoshi Nakajima* (NIFS) pursued novel research on understanding "burst modes" observed in CHS. He collaborated with Dr. H. Berk and Dr. B. Breizman at IFS. Burst modes in CHS are driven by NBI energetic ions and have similar properties to those of fishbone instabilities. On the basis of an analysis of ideal MHD stability, the collaborative study concluded that the modes are probably ideal interchange modes. Furthermore, a global non-resonant interchange mode is thought to play an important role. The collaboration has continued, and Dr. Nakajima and Dr. Breizman again discussed these fishbone-type burst modes in Japan during the workshop on Confinement Theory and Experiment in Toroidal Systems that was held at NIFS October 20-22, 1999.
- *Dr. Toshihiro Taguchi* developed a computer simulation code that can analyze electron transport in "fast ignition" inertia fusion plasma, in a collaboration with Prof. T. M. Antonsen of the University of Maryland. The transport of electrons (and their stability) is very important in the fast ignition-type of inertia plasma, and a very efficient simulation code was successfully developed. During his visit, he also studied physics in the boundary between stimulated backward Raman scattering and stimulated Compton scattering, using a one-dimensional simulation code in a collaboration with Prof. C. S. Liu. A relation was found between the linear growth rate and the frequency of amplitude oscillations when saturation is caused by the capture of electrons in stimulated Raman scattering.
- *Dr. Katsuji Ichiguchi* studied the generalized reduced-MHD equations (GRMHD) with Dr. C. Hegna at the University of Wisconsin. He carefully investigated the derivation of the GRMHD equations. He also studied neoclassical tearing modes in helical systems such as LHD and CHS. This is important because it is possible, even in heliotron/torsatron devices, that the neoclassical tearing mode may become unstable where the magnetic shear is negative shear or when a bootstrap current flows in the "opposite" direction (i.e., so as to reduce the rotational transform). After staying at the University of Wisconsin, he visited SAIC in San Diego to work on developing a code for solving the GRMHD equations, in collaboration with Dr. S. Kruger.
- *Dr. Hideo Sugama* (NIFS) will visit the IFS as the Visiting Professor for three months, beginning March 25, 2000. He will study micro-instabilities and plasma transport, in collaboration with Prof. W. Horton.
- *Dr. Boris Breizman* (IFS) visited JAERI and NIFS as a visiting scientist. He attended the 6th IAEA Technical Committee Meeting on Energetic Particles in Magnetic Confinement Systems held at JAERI and joined the JIFT workshop on Confinement Theory and Experiment in Toroidal Systems held at NIFS. He described his recent work on nonlinear

bursts of particle driven modes. During his stay in Japan he continued collaborations with Dr. N. Nakajima and Dr. K. Toi on theoretical investigation of the burst modes observed in CHS. Dr. K. Toi described the detailed data from CHS experiments. It was found that the burst modes are similar to fishbone instabilities in tokamaks, but more complicated and hence not able to be understood within the traditional framework of fishbone theory.

- *Dr. Prashant Valanju* (FRC, U. Texas) stayed at NIFS for three months as the Visiting Professor. He worked on several projects. He studied the coil design for the quasi-axisymmetric stellarator (QAS), in collaboration with Dr. S. Okamura and Dr. K. Matsuoka. He also discussed how to incorporate his neutral transport code into Dr. K. Yamazaki's transport code. He found a new topology ("wavy" vertical field coils) for QASs that simplifies coil complexity, permits improved access, and may allow the design of a divertor. He also found a new way of implementing arbitrary-grid geometry in his fast 3-D neutral transport code. This will be useful in simulating fully three-dimensional geometry such as that for LHD and for divertors. He presented a total of six talks to various groups at NIFS with the following titles: (1) A series of three talks on new ideas and tools for designing optimized coils for low-A stellarators; (2) Quasi-axisymmetric coils for a quasi-axisymmetric stellarator; (3) A fast semi-analytic 3-D neutral transport code; and (4) On the novel use of a neutral beam to measure the q-profile. In addition, he spent much time in discussions about confinement theory with the members of Theory and Data Analysis division. In particular, he talked with Dr. K. Itoh about a new way of addressing far-nonequilibrium systems and with Dr. T. Hayashi and N. Nakajima about the HINT code. At the end of his stay, he visited the University of Tokyo and discussed double-Beltrami flows with Dr. Z. Yoshida.

Twelve JIFT joint computational projects on various topics were also active during the past year. Some of these projects involved limited travel.

4. Program Administration

JIFT has a Steering Committee of eight members, four from each country, with two co-chairmen. The co-chairman on the Japanese side is the director of the Theory and Computer Simulation Center at the National Institute for Fusion Science. The co-chairman on the US side is the director of the Institute for Fusion Studies (IFS) of The University of Texas at Austin. Two other members of the Steering Committee, who are called co-executive secretaries, are responsible for the ongoing daily oversight of the progress of JIFT activities. Furthermore, on the Japanese side there is one official Advisor, who is from the Japan Atomic Energy Research Institute; and on the US side there is an Advisory Committee comprised of several members. The names of the persons on the Steering Committee and the names of the Advisors are listed below:

JIFT Steering Committee

US Members

R. Hazeltine (IFS)—Co-Chairman
J. Van Dam (IFS)—Co-Exec. Secretary
W. Sadowski (DOE)
J. Dawson (UCLA)

Japanese Members

T. Sato (NIFS)—Co-Chairman
M. Okamoto (NIFS)—Co-Exec. Secretary
M. Wakatani (Kyoto)
K. Mima (Osaka)

JIFT Advisors

Japanese Advisor: Y. Kishimoto (JAERI)

US Advisory Committee: A. Aydemir (IFS), P. Catto (MIT), B. Carreras (ORNL), V. Chan (GA), B. Cohen (LLNL), J. Johnson (PPPL), W. Horton (IFS), J. Leboeuf (ORNL), T. Tajima (IFS), W. Tang (PPPL), and P. Terry (UWM)

The Steering Committee attempts to schedule workshops in such a way as to dovetail with other meetings, to involve participation at workshops by interested experimentalists, and to invite relevant available scientists from other countries to attend workshops.

As the principal program for fundamental theoretical exchanges in the US-Japan Fusion Research Collaboration, JIFT operates alongside the Fusion Physics Planning Committee (FPPC) and the Fusion Technology Planning Committee (FTPC). In particular, the JIFT activities are coordinated with the four FPPC areas of activity, viz., core plasma phenomena, edge behavior and control, heating and current drive, and new approaches and diagnostics.

5. Recent JIFT-Related Publications

Below are listed 28 papers published recently (or about to be published) in connected with JIFT activities.

A. Boozer, "Advanced confinement concepts and theory," *Nucl. Fusion* 37 (1997) 701-704.

B. A. Carreras, V. E. Lynch, H. Zushi, K. Ichiguchi, and M. Wakatani, "Internal disruptions in Heliotron E," in *Proceedings of the 17th IAEA Fusion Energy Conference*

S. Cheshkov, T. Tajima, W. Horton, and K. Yokoya, "Particle dynamics and its consequences in wakefield acceleration in a high energy collider," in *Advanced Accelerator Concepts, AIP Conference Proceedings No. 472*, ed. W. Lawson (AIP Press, New York, 1999), p. 343.

T. Hayashi and T. Sato, "Self-Organization Plasmas," *Plasma Phys. Control. Fusion* 41, A229 (1999).

R. Horiuchi and T. Sato, "Particle simulation of collisionless reconnection in three dimensions," *Plasma Phys. Control. Fusion* 41, A229 (1999).

W. Horton and Y.-H. Ichikawa, "Chaos and structures in nonlinear plasmas," *Eos Transactions (American Geophysical Union)* 79 (26), 304 (1998).

Y. Kishimoto, J.-Y. Kim, W. Horton, T. Tajima, M. J. LeBrun, and H. Shirai, "Toroidal mode structure in weak and reversed magnetic shear plasmas and its role in the internal transport barrier," *Plasma Phys. Control. Fusion* 40 (3A), A663-A678 (1998).

G. K. Kramer, C. Z. Cheng, G. Y. Fu, Y. Kusama, R. Nazikian, T. Ozeki, and K. Tobita, "Frequency chirping of core-localized toroidicity-induced Alfvén eigenmodes and their coupling to global Alfvén eigenmodes", *Phys. Rev. Lett.* 11, 2961(1999).

G. Kramer et al., "Fast particle experiments in JT-60U," *Proceedings of the 6th IAEA Technical Committee Meeting on Energetic Particles in Magnetic Confinement Systems, 12-14 October, 1999, JAERI-Memo No. 11-177 (January, 2000)*, p. 82.

T. Kuroda, H. Sugama, R. Kanno, M. Okamoto, and W. Horton, "Initial value problem of the toroidal ion temperature gradient mode," *J. Phys. Soc. Jpn.* 67 (11), 3787-3793 (1998).

Y. Kusama, T. Ozeki, G. Y. Fu, C. Z. Cheng, et al., "Characteristics of Alfvén eigenmodes, burst modes, and chirping modes in the Alfvén frequency range driven by negative ion based neutral beam injection in JT-60U," *Nucl. Fusion* 39, 1837 (1999).

S. M. Mahajan and Z. Yoshida, "A collisionless self-organizing model for high-confinement (H-mode) boundary layer," *Phys. Plasmas* 7, 635-640 (2000).

J. Manickam, T. Fujita, N. Gorelenkov, A. Isayama, Y. Kamada, M. Okabayashi, M. Bell, R. Bell, R. Budny, E. Fredrickson, S. Ishida, Y. Ishida, F. Levinton, T. Ozeki, H. Shirai, S. Takeji, and M.

- Zarnstorff, "Localized MHD activity near internal transport barriers in JT-60U and TFTR," Nucl. Fusion 39, 1819 (1999).
- N. Mizuguchi, T. Hayashi, and T. Sato, "Convective loss of heat energy excited in the edge region of spherical tokamak," Contributions to Plasma Physics, in press,
- K. Moribayashi, A. Sasaki, and T. Tajima, "X-ray emission by ultrafast inner-shell ionization from vapors of Na, Mg, and Al," Phys. Rev. A 59(4), 2732-2737 (1999).
- S. Murakami and V. Chan, "3-D electric field effects in a Fokker-Planck Monte Carlo simulation," NIFS Report No. 582 (1999), in preparation for publication.
- M.G. Raizen, J. Koga, B. Sundaram, Y. Kishimoto, H. Takuma, and T. Tajima, "Laser cooling without spontaneous emission," Phys. Rev. A 58, 4757 (1998).
- A. Sasaki, T. Utsumi, K. Moribayashi, T. Tajima, and H. Takuma, "Calculation of ion abundance of collisional X-ray lasers using thin foil targets," Rev. Laser Engin. 27, 185 (1999).
- H. Sugama, "Damping of toroidal ion temperature gradient modes," Phys. Plasmas 6, 3527-3535 (1999).
- H. Sugama, "Gyrokinetic field theory," Phys. Plasmas 7, 466-480 (2000).
- H. Sugama and W. Horton, "Nonlinear electromagnetic gyrokinetic equation for plasmas with large mean flows," Phys. Plasmas 5 (7), 2560-2573 (1998).
- T. Tajima, S. Cheshkov, W. Horton, and K. Yokoya, "A nonlinear particle dynamics map of wakefield acceleration in a linear collider," in Advanced Accelerator Concepts, AIP Conference Proceedings No. 472, ed. W. Lawson (AIP Press, New York, 1999), p. 153.
- T. Tajima, Y. Kishimoto, and M. C. Downer, "Cluster plasma and its dispersion relation," Phys. Plasmas 6, 3759 (1999).
- Y. Todo and T. Sato, "Kinetic-magnetohydrodynamic simulation study of fast ions and toroidal Alfvén eigenmode," Proceedings of the International Conference on Nuclear Fusion Research 1998 (International Atomic Energy Agency, Vienna, to be published, 2000).
- M. Toida, D. Dogen, and Y. Ohsawa, "Collisionless damping of low-frequency magnetosonic pulses in a multi-ion-species plasma," J. Phys. Soc. Jpn. 68, 2157-2160 (1999).
- Y. Ueshima, Y. Kishimoto, A. Sasaki, and T. Tajima, "Laser Larmor X-ray radiation from low-Z matter," Laser Part. Beams 17(1), 45-58(1999).
- W. X. Wang, N. Nakajima, M. Okamoto, and S. Murakami, "A new delta-f method for neoclassical transport studies," Plasma. Phys. Control. Fusion 41, 1091 (1999).
- P. Zhu, W. Horton, and H. Sugama, "The radial electric field in a tokamak with reversed magnetic shear," Phys. Plasmas 6, 2503-2512 (1999).

6. Plans for Future Activities

The topics and themes of the exchange activities that have been proposed for the next year (April 1, 2000–March 31, 2001) are consistent with the traditional emphasis of JIFT on fundamental theoretical plasma physics issues, but at the same time have direct relevance to the fusion science programmatic interests of both countries.

The schedule of proposed activities is listed in the following Attachment.

ATTACHMENT

Proposals for April 1, 2000 to March 31, 2001 Program US-Japan Joint Institute for Fusion Theory

A. 2000-2001 Workshops

US to Japan:

- J __ *Physics of Plasma Flow and Its Application to High Beta Plasmas*
Organizers: Y. Ogawa, Z. Yoshida (U. Tokyo); S. Mahajan (IFS)
Proposed Place/Time: U. Tokyo, December 11-14, 2000
- J __ *Workshop on Self-Organization*
Organizers: R. Horiuchi (NIFS); W. Horton (IFS)
Proposed Place/Time: NIFS, November 27-December 6, 2000

Japan to US:

- I __ *Effects of High Energy Particles on MHD Modes*
Organizers: N. Nakajima, Y. Todo (NIFS); J. Van Dam (IFS); R. Nazikian (PPPL)
Proposed Place/Time: Burlington, VT, April 24-30, 2000
- I __ *High Field Science*
Organizers: K. Mima (ILE, Osaka U.); C. S. Liu (U. Maryland); T. Tajima (IFS)
Proposed Place/Time: U. Maryland, Oct 29–Nov 1, 2000
- I __ *JIFT Steering Committee Meeting*
Organizers: T. Sato (NIFS); R. Hazeltine (IFS)
Proposed Place/Time: to be determined

B. 2000-2001 Exchange Visits

Japan to US:

- JL __ *Nonlinear Evolution of Alfvén Eigenmodes*
Yasushi Todo (NIFS), Visiting Professor (paid by US)
Plans to visit IFS, September 4-November 30, 2000
- JL __ *Study on Turbulent Transport in Tokamak Plasmas*
Satoshi Hamaguchi (Kyoto U.), Visiting Scientist
Plans to visit IFS and PPPL, August 26-October 10, 2000
- JL __ *Magnetohydrodynamic Dynamo Effect*
Akira Kageyama (NIFS), Visiting Scientist
Plans to visit PPPL, August 28-November 24, 2000

JL — *Development of Laser Plasma Analysis Codes*
Hitoshi Sakagami (Himeji Technological U.), Visiting Scientist
Plans to visit LLNL, August 7-November 5, 2000

JL — *Study on the Transport of Toroidal Plasma*
Masao Okamoto (NIFS), Visiting Scientist
Plans to visit GA, August July 31-August 15, 2000

US to Japan:

IL — *Theoretical Study for Equilibrium, Stability, and Transport in Helical Systems*
Paul Garabedian (NYU), Visiting Professor (paid by Japan)
Plans to visit NIFS, January 16-April 15, 2001

IL — *Physics Consideration on the New Helical System*
Prashant Valanju (FRC, UT), Visiting Scientist
Plans to visit NIFS, September 17-December 16, 2000

IL — *LHD High Beta Data Analysis*
G. Fu or D. Mikkelsen (PPPL), Visiting Scientist
Plans to visit NIFS for two weeks (M. Okamoto is the Japanese contact)

IL — *Microinstability Studies for Toroidal Plasmas*
G. Rewoldt (PPPL), Visiting Scientist
(This was deferred from FY99, FP2-5, in ~June 2000.)
Plans to visit JAERI and NIFS for 2 weeks (M. Okamoto and Y. Kishimoto are the Japanese contacts)

IL — *Microinstability Studies for Toroidal Plasmas*
G. Rewoldt (PPPL), Visiting Scientist
Plans to visit JAERI and NIFS for 2 weeks in February-March, 2001 (M. Okamoto and Y. Kishimoto are the Japanese contacts)

IL — *Study of Structure Formation in Magnetized Plasmas*
P. Diamond (UCSD), Visiting Scientist
Plans to visit Kyoto and NIFS (M. Wakatani is the Japanese contact); still pending.

C. 2000-2001 Joint Computational Projects

JC 1 *MHD Stability in Advanced Tokamaks*
S. Tokuda, Y. Ishii, M. Ozeki (JAERI); J. Manickam (PPPL); A. Aydemir (IFS);
continued from 1999-2000.

JC 2 *Gyrokinetic Transport Simulation*
J. Dawson, V. Decyk, and R. Sydora (UCLA); W. Lee (PPPL); T. Sato and T. Takayama
(NIFS); H. Naitou (Yamaguchi); continued from 1999-2000.

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- JC 4** *Plasma Rotation, Vortices, and Anomalous Transport*
W. Horton, A. Aydemir, and K. Shaing (IFS); B. Carreras (ORNL); M. Okamoto and S. Murakami (NIFS); M. Wakatani (Kyoto); continued from 1999-2000.
- JC 8** *3-D Codes and Island Formation*
A. Boozer (Columbia); D. Monticello (PPPL); C. Hegna (Wisc.); T. Hayashi and R. Kanno (NIFS); Y. Nakamura (Kyoto U.); continued from 1999-2000.
- JC 9** *New Simulation Algorithms for Massively Parallel Processing*
J. Dawson and V. Decyk (UCLA); W. Tang (PPPL); K. Watanabe, R. Horiuchi, and S. Ishiguro (NIFS); continued from 1999-2000.
- JC 14** *Toroidal Simulation and Plasma Transport Modeling*
T. Tajima and W. Horton (IFS); Y. Kishimoto and M. Azumi (JAERI); M. Takamaru (NIFS); continued from 1999-2000.
- JC 19** *Numerical Study of High Energy Particle Effect on MHD Stability*
C. Z. Cheng (PPPL); J. Van Dam (IFS); T. Ozeki and M. Azumi (JAERI); Y. Todo (NIFS); continued from 1999-2000.
- JC 21** *Turbulent Transport Applications to Tokamaks and Helical Systems*
B. Carreras (ORNL); W. Horton (IFS); M. Wakatani and Y. Nakamura (Kyoto); H. Sugama and M. Yokoyama (NIFS); continued from 1999-2000.
- JC 22** *Tokamak Simulation on Massively Parallel Computers*
B. Carreras, D. Spong, J.N. Leboeuf (ORNL); J. Leboeuf, J. Dawson, and V. Decyk (UCLA); S. Tokuda and G. Kurita (JAERI); T. Watanabe (NIFS); continued from 1999-2000.
- JC** — *MHD and Transport Phenomena in Toroidal Systems*
W. Tang, G. Rewoldt, C. Z. Cheng (PPPL); S. Kida, H. Sugama, R. Ishizaki (NIFS); continued from 1999-2000.
- JC** — *Kinetic Effects on MHD Phenomena*
H. Berk, J. Van Dam, and B. Breizman (IFS); M. Okamoto, N. Nakajima, and K. Ichiguchi (NIFS); continued from 1999-2000.
- JC** — *Two-Fluid Model for Plasma Simulation*
B. Coppi, T. Takaya, and L. Sugiyama (MIT); T. Sato, H. Miura, and M. Tanaka (NIFS); continued from 1999-2000.
- JC** — *Monte-Carlo Simulation for Plasma Transport*
V. Chan, W. Wang (GA); M. Okamoto, N. Nakajima, S. Murakami (NIFS); new.