TO: Executive Secretaries of the US-Japan Fusion Research Collaboration

FROM: Steering Committee, US-Japan Joint Institute for Fusion Theory (JIFT)

DATE: April 29, 2004

SUBJECT: JIFT Annual Report of Activities for 2003-2004

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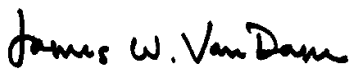

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Annual Report of Activities

US-Japan Joint Institute for Fusion Theory

April 1, 2003–March 31, 2004

submitted by the

JIFT Steering Committee

Co-Chairmen: M. Okamoto and J. W. Van Dam

Co-Executive Secretaries: R. Horiuchi and F. L. Waelbroeck

April 29, 2004

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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 three types of exchange program activities—namely, workshops, exchange visitors, and joint computational projects.

Each year the JIFT program usually consists of 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 22 years of successful operation, JIFT has sponsored 125 long-term visits by exchange scientists, 79 topical workshops, and 135 joint computational projects.

- The *workshops* typically have an attendance of 15–30 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 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.

2. *SUMMARY OF COMPLETED ACTIVITIES (2003-2004 PROGRAM)*

Almost all of the activities in the three categories—workshops, personal exchanges, and joint computational projects—that had been scheduled for the 2003-2004 JIFT program were carried out during the past year. All four workshops were successfully held, in addition to the JIFT Steering Committee meeting. In the category of personal exchanges, two Visiting Professors and five Visiting Scientists made exchange visits, while two other exchange visits were deferred. The JIFT joint computational projects were also active.

Summary reports about the JIFT activities for the past year (April 1, 2003–March 31, 2004) are given below.

A. 2003-2004 Workshops

US to Japan:

JF1-01 ***Theoretical and Numerical Progress of Fusion Plasmas***
Organizers: Noriyoshi Nakajima (NIFS), James Van Dam (IFS), and Donald Monticello (PPPL)
Location: Ceratopia, Toki
Dates: December 12, 2003
Summary:

Future collaborations using advanced theoretical MHD models were discussed. Major objectives of these collaborations are (1) to use advanced theoretical MHD models, such as MHD equilibrium solvers allowing the

existence of magnetic islands, large-scale nonlinear MHD simulation codes, two-fluid codes, and MHD-particle hybrid codes, for analysis of LHD experimental results, and (2) to extend these codes for the analysis of burning plasmas. Some of these collaborations have already started.

JF1-02 ***Theory-Based Modeling and Integrated Simulation of Burning Plasmas***
Organizers: Atsushi Fukuyama (Kyoto University), Jean-Noel Leboeuf (UCLA), and James Van Dam (IFS Texas)
Location: Kyoto University
Dates: December 15-17, 2003
Summary:

In order to predict the behavior of burning plasmas and to develop reliable control schemes, integrated simulation codes composed of modules describing various phenomena in toroidal plasmas need to be constructed. Recent progress in the modeling of global stability, wave-plasma interaction, turbulence transport, and edge plasma was described. The present status of integrated simulations based on 1-1/2D transport analysis and comparison with experimental profile databases was also reported, and methods for the integration of simulations were discussed. The agenda is available at http://p-grp.nucleng.kyoto-u.ac.jp/bpsi/usjws/.

JF1-11 ***JIFT Steering Committee Meeting***
Organizers: Masao Okamoto (NIFS) and James Van Dam (IFS)
Location: NIFS, Toki, Japan
Dates: December 12, 2003
Summary:

The status of JIFT activities for 2003-04 was reviewed, and recommendations for next year's activities were discussed.

Japan to US:

JF1-05 ***Scope of Simulation Science***
Organizers: Oleg Batishchev (MIT) and Ritoku Horiuchi (NIFS)
Location: Falmouth, MA
Dates: September 7-10, 2003
Summary:

This US-Japan workshop (http://web.mit.edu/ned/ICNSP/scopesimulationwkshp.html) was held in conjunction with the 18th International Conference on Numerical Simulation of Plasmas. The organizers appreciated assistance received from Jean-Noel Leboeuf and Viktor Decyk (UCLA). The workshop shed light on simulation science as a new methodology of science and clarified future prospects for simulations. The conference had 128 oral and poster contributions, presented by more than 120 participants. The strong Japanese delegation consisted of ten participants, three of whom gave invited oral talks. The presentations and discussions covered a broad variety of plasma simulations: MHD, kinetic plasmas, PIC, Vlasov, hybrid methods, PIC-DSMC, gyro-kinetic, gyro-fluid, grid-free, molecular dynamics, high-order/adaptive/multi-scale methods, and scientific visualization for numerical simulation. The participants discussed recent plasma simulations and described numerical techniques in various scientific fields, such as space and astrophysical plasmas, magnetic and inertial fusion plasmas, intense laser interaction with plasma, beam and accelerator physics, low temperature plasmas, dusty plasmas, nano-plasmas, and various plasma-based devices. This workshop also provided an important forum for the communication of new ideas concerning algorithm development, massively parallel processing, and programming techniques. It was agreed to hold a follow-up workshop in Japan in June 2005.

Related publications:

- A book of abstracts (400 pages) is available on-line at http://web.mit.edu/ned/ICNSP/abstracts.html.
- The proceedings will be published as a special issue of *Computer Physics Communications Journal* (UK), which will include about 75 refereed articles.
- A conference CD will be available by late spring or summer.

JF1-06 ***Structure Formation in Plasma and Fluid Turbulence***
Organizers: Patrick Diamond (UCSD) and Masatoshi Yagi (Kyushu University)
Location: University of California at San Diego
Dates: September 18-25, 2003

Summary:

Transport in tokamaks was discussed analytically and numerically, with emphasis on the interaction between drift wave turbulence and zonal flow. New analytical methods—for example, a statistical approach—were proposed for transport and bifurcation phenomena. The similarities and differences of anomalous transport observed in neutral fluids, the ocean-atmosphere system, and space plasmas were discussed. A new collaboration on high beta plasma turbulence was proposed by fusion plasma theorists and space plasma theorists.

Related publications:

M. Yagi, "Report of US-Japan JIFT Workshop on Structures and Self-Organization in Turbulent Plasmas and Fluids," Journal of Plasma and Fusion Research **79**, 1197 (2003).

B. 2003-2004 Exchange Visits

Japan to US:

JF1-07 ***Study on the Zonal Flow Effect on Plasma Microturbulence***

Exchange scientist: Masatoshi Yagi (Kyushu University)
Locations: University of California at San Diego; Princeton Plasma Physics Laboratory
Dates: January 25–February 1, 2004 (ten days); paid by Japan
Summary:

A hierarchical model for plasma transport was proposed that includes nonlinear interaction between different scale lengths. Two examples were shown for the application of this model. One is non-local transport based on transport-MHD model. Plasma rotation is produced by ExB nonlinearity, which converts heating source to momentum (zonal flow generation). Synergetic effect between plasma rotation and local (gyro-Bohm) transport produces non-local transport in this model. The other example involves multi-scale turbulence by ion temperature gradient-driven drift wave and short wavelength ion temperature gradient-driven drift wave. It was shown that non-adiabatic electron response produces the strong nonlinear interaction. As the result, not only zonal flow but also streamer or other Fourier modes are excited in convective cell due to the drift wave turbulence. Future trends of simulation research regarding plasma turbulence were also discussed.

Recent JIFT-related publications:

- M. Yagi, "Simulation of Hierarchical Interaction Based on Transport-MHD Model," J. Plasma Fusion Res. **79** (3), 470-477 (2003) (in Japanese)

JF1-08 ***Study of Kinetic MHD Modes Due to Kinetic FAR Code***

Visiting Professor: Hiroshi Naitou (Yamaguchi University)
Location: University of California at Los Angeles
Dates: August 1–31, 2003 (one month); paid by US
Research Summary:

In order to study the effect of vortex generation on the nonlinear development of the m/n=1/1 kinetic internal kink mode in toroidal geometry, the gyro-reduced MHD formulation was installed in the FAR code, which is a resistive reduced-MHD code. The new code is called Kinetic FAR, or KFAR. For the cylindrical limit, the linear stability of the kinetic internal kink mode with electron diamagnetic effects was studied with the KFAR code and compared with the results of the GRM3D code (a gyro-reduced MHD code in cylindrical geometry). Results from the two codes agree very well. ITER-relevant kinetic models of internal kink modes in tokamaks, which include electron inertia and electron diamagnetic effects in a reduced MHD plasma model, were independently developed and benchmarked in cylindrical geometry. The linear stability of the kinetic internal kink mode in toroidal geometry was also investigated. Both cylindrical and toroidal implementations in FAR confirm that electron inertia is destabilizing while electron diamagnetic effects are strongly stabilizing linearly. Nonlinear calculations in cylindrical and toroidal geometry are underway to further elucidate the role of the secondary Kelvin-Helmholtz instability occurring in cylindrical geometry with saturation of the internal kink instability. The nonlinear study in cylindrical and toroidal geometry will be completed in the near future.

Related publications:

- H. Naitou, J.-N. Leboeuf, H. Nagahara, T. Kobayashi, M. Yagi, T. Matsumoto, S. Tokuda, "Vortex Generation and Collisionless Internal Kink Mode in Tokamaks," U.S.-Japan Joint Institute for Fusion

Theory Workshop on Structures and Self-Organization in Turbulent Plasmas and Fluids (University of California, San Diego, CA, September 19 and September 22-23, 2003).

- M. Yagi, S. Yoshida, S.-I. Itoh, H. Naitou, H. Nagahara, J.-N. Leboeuf, K. Itoh, T. Matsumoto, S. Tokuda, and M. Azumi, "Nonlinear simulation of tearing mode and m=1 internal kink mode based on kinetic RMHD model," to be presented at the 20th IAEA Fusion Energy Conference (November 2004, Vilamoura, Portugal).

JF1-09 ***Simulation Study of RF Heating and Energetic Particle Transport***
Exchange scientist: Sadayoshi Murakami (Kyoto University)
Location: General Atomics
Dates: July 15–25, 2003 (10 days); paid by Japan
Summary:

During this exchange visit we had discussions about the simulation, modeling, and validation of ICRH physics. We agreed to carry out detailed benchmarking of our two independently developed Monte-Carlo codes— GNET (S. Murakami) and ORBIT-RF (GA theory group)—and then proceed with joint development of new capabilities. Also, we had discussions about the simulation, modeling and validation of ECRH physics. We undertook a collaboration to add the GNET code to the suite of codes for studying ECRH and ECCD.

JF1-10 ***Singularities in Plasma with Flow and Stability Analysis***
Exchange scientist: Shuichi Ohsaki (Tokyo University)
Location: Institute for Fusion Studies
Dates: July 1–September 24, 2003 (three months); paid by Japan
Summary:

In ideal inhomogeneous magnetohydrodynadynamics (MHD), the Alfven wave (the dominant low frequency mode of a magnetized plasma) displays a continuous spectrum associated with singular eigenfunctions. It is shown that the coupling of the Hall term with the sound wave induces higher (fourth) order derivative in the Alfven mode equation, and by resolving the singularity replaces the MHD continuum by a discrete spectrum. The mode structure resulting from the Hall resolution of the singularity is compared with the standard electron-inertia approach.

Related publications:

- S. Ohsaki and S. M. Mahajan, Phys. Plasmas **11**, 898 (2004).
- Z. Yoshida, S. Ohsaki, A. Ito, and S. M. Mahajan, J. Math. Phys. **44**, 2168 (2003).
- S. Ohsaki, N. Shatashvili, Z. Yoshida and S. M. Mahajan, Astrophys. J. **570**, 395 (2002).
- S. Ohsaki, N. Shatashvili, Z. Yoshida and S. M. Mahajan, Astrophys. J. Lett. **559**, L61 (2001).

US to Japan:

JF1-04 ***Study on Peripheral and Divertor Plasma***
Visiting Professor: Sergei Krasheninnikov (UCSD)
Location: NIFS
Dates: September 17–December 19, 2003 (three months); paid by Japan
Research Summary:

This visit (for which Dr. Krasheninnikov used his fall sabbatical) focused on two main topics of research: (a) intermittent anomalous transport in fusion plasmas and (b) dust dynamics in fusion devices. While the first topic was a continuation of Dr. Krasheninnikov's current research, the second topic was a new subject, on which almost no research had been done previously by anyone. On both of these topics he was able to find some interesting results and write two papers, which, at the end of his visit sabbatical, were submitted to refereed journals and have now accepted for publication. In addition, during his sabbatical he gave three invited/oral talks at various meetings and presented three seminars.

Related publications:

- S. I. Krasheninnikov, D. D. Ryutov, and G. Yu, "Large plasma pressure perturbations and radial convective transport in a tokamak," to be published in Journal of Plasma and Fusion Research, Vol. 6, 2004 (Proceedings of the 13th International Toki Conference).
- S. I. Krasheninnikov, Y. Tomita, R. D. Smirnov, and R. K. Janev, "On dust dynamics in tokamak edge plasmas," presented at the US-Japan JIFT Workshop on Theory-based Modeling and Integrated Simulation

of Burning Plasmas (December 15-17, 2003, Kyoto University, Kyoto, Japan); to be published in Physics of Plasmas, June 2004.

- S. I. Krasheninnikov, "Blobs in edge plasmas," in Proceedings of the Meeting on Advances in Nonlinear Fluid and Plasma Dynamics" (December 3-4, 2003, Kyushu University, Japan).

JF1-03 ***Relaxation Dynamics of an Incompressible Plasma Using Beltrami Function Expansion with Application to Compact Toroids***

Exchange scientist: Loren Steinhauer (University of Washington)
Location: Niigata University; also a one-day visit to Tokyo University
Dates: September 30–October 12, 2003 (two weeks); paid by US
Summary:

Research was conducted during this visit on four topics. (1) Formalism for flowing two-fluid equilibria—The general formalism for a flowing two-fluid plasma equilibrium had been developed earlier (Steinhauer, 1999). Recent improvements in this formulation, including a more proper treatment of the species entropy by Ishida were discussed. This work was later presented at the 13th International Toki Conference. (2) Fourth-order finite-difference method—The successive-overrelaxation (SOR) method is efficient for computing Grad-Shafranov equilibria. It is being adapted for solving two-fluid flowing equilibria, for which there are three unknown scalar functions to be determined: viz., the magnetic and flow stream functions and the density. In order to make this computation more accurate, a fourth-order finite difference algorithm was developed for the Grad-Shafranov operators. (3) Innovative boundary method—A difficulty with the SOR method with a vertical field component is that the numerical relaxation process does not precisely converge. In particular the poloidal flux tends to decay to zero. This is the result of having an internal separatrix. An alternate method is to pre-specify (i.e., guess) the separatrix shape, use this as a boundary for both the internal and external fields, and iterate to a solution. This iteration converges rapidly. During this step the true outer boundary is kept free. Then the field (magnetic stream function) at the true outer boundary is compared with the computed value. The separatrix shape is adjusted accordingly and the iteration is repeated. While this does not yield an exact solution fitting the outer boundary, it can be used to approximately achieve an approximate fit there. (4) Relaxation theory—The relaxation of experimental FRCs in ejection experiments on the TCS facility at the University of Washington were discussed during the visit to Tokyo University. An interpretive model was used to infer the helicities of the plasmoid. The TCS experiments are the first evidence of magnetic helicity preservation in the formation of a high-beta plasma.

*Related references:*Ishida, H. Caesar, L. C. Steinhauer, and Y.-K. M. Peng, "Improved Formalism for Flowing Two-Fluid Equilibrium and Its Application to ST," ," to be published in Journal of Plasma and Fusion Research, Vol. 6, 2004 (Proceedings of the 13th International Toki Conference).

JF1-12 ***Analysis of Micro-instability in LHD and JT-60U Plasmas***

Exchange scientist: Gregory Rewoldt (PPPL)
Proposed visit: NIFS and JAERI; summer 2003 (two weeks); paid by US
Status: Deferred

JF1-13 ***LHD High Beta Plasma Analysis***

Exchange scientist: Guoyong Fu (PPPL)
Proposed visit: NIFS and JAERI; fall 2003 (two weeks); paid by US
Status: Deferred

JF1-14 ***Resistive Wall Mode in General Geometry***

Exchange scientist: Ming-Sheng Chu (General Atomics)
Location: JAERI, Naka
Dates: February 8–March 8, 2003 (one month, deferred from last year); paid by US
Summary:

The research subject of this exchange visit was theoretical and numerical analysis of the resistive wall mode and its stabilization. The main collaborators at JAERI were Drs. T. Ozeki, G. Kurita, and S. Tokuda. During this visit, the MARS code was benchmarked with the AEOLUS code. A library of circular cross-section equilibria with various q-values at the edge was selected to determine their stability to the external kink mode and the resistive wall mode. Both eigenvalues and eigenfunctions were obtained. The effect of rotation on this set of equilibria was also demonstrated. A D-shaped equilibrium was chosen to benchmark the rotational stabilization

of the resistive wall mode. The normal mode approach to feedback stabilization of the resistive wall mode was discussed with JAERI scientists. Several discussions were also held with JAERI scientists about the existence of tokamak equilibria with a zero current or negative current central region. Dr. Chu also attended the Eighth Meeting of the NEXT Project in Tokyo and presented a talk about the status of MHD numerical computational research in the US. He will continue his collaboration on the benchmarking of the MARS code with AEOLUS; a joint publication summarizing this benchmarking is planned. He also will collaborate on the equilibrium and stability study of current holes and resistive instabilities.

C. 2003-2004 Joint Computational Projects

The following eleven JIFT joint computational projects on various topics were also active during the past year.

JF2-01 ***Gyrokinetic Transport Simulation***
V. Decyk, R. Sydora (UCLA), W. Lee (PPPL);
T. Takayama (NIFS), H. Naitou (Yamaguchi)

JF2-02 ***Plasma Rotation, Vortices, and Anomalous Transport***
W. Horton, A. Aydemir (IFS), B. Carreras (ORNL);
M. Okamoto, H. Sugama (NIFS), S. Murakami (Kyoto)

JF2-03 ***MHD Stability in Advanced Tokamaks***
M. Ozeki, Y. Ishii (JAERI), Y. Tomita (NIFS);
J. Manickam (PPPL), A. Aydemir (IFS)

JF2-04 ***New Simulation Algorithms for Massively Parallel Processing***
V. Decyk (UCLA), W. Tang (PPPL);
K. Watanabe, R. Horiuchi, S. Ishiguro (NIFS)

JF2-06 ***Toroidal Simulation and Plasma Transport Modeling***
W. Horton (IFS);
Y. Kishimoto, A. Azumi (JAERI), H. Takamaru (NIFS)

JF2-07 ***Numerical Study of High Energy Particle Effect on MHD Stability***
C.Z. Cheng (PPPL), J. Van Dam (IFS);
M. Azumi, T. Ozeki (JAERI), Y. Todo (NIFS)

JF2-08 ***Turbulent Transport Applications to Tokamaks and Helical Systems***
B. Carreras (ORNL); W. Horton (IFS)
Y. Nakamura (Kyoto); M. Yokoyama (NIFS)

JF2-09 ***Tokamak Simulation on Massively Parallel Computers***
B. Carreras, D. Spong (ORNL), J.N. Leboeuf, V. Decyk (UCLA);
S. Tokuda, F. Kurita (JAERI), T. Watanabe (NIFS)

JF2-10 ***MHD and Transport Phenomena in Toroidal Systems***
W. Tang, G. Rewoldt, C.Z. Cheng (PPPL);
H. Sugama, R. Ishizaki (NIFS)

JF2-11 ***Kinetic Effects on MHD Phenomena***
J. Van Dam, H. Berk (IFS);
M. Okamoto, N. Nakajima, K. Ichiguchi (NIFS)

JF2-12 ***Benchmarking Kinetic Stability Code for Toroidal Devices***
G. Rewoldt (PPPL);
Y. Idomura (JAERI), A. Fukuyama (Kyoto)

3. *PROGRAM ADMINISTRATION*

JIFT has a Steering Committee consisting of eight members, four from each country. Two of these members are the Japanese and US co-chairmen. Two other members of the Steering Committee, the US and Japanese co-executive secretaries, are responsible for the ongoing daily oversight of the progress of JIFT activities. The co-chairman and co-executive secretary on the US side are, respectively, the director and associate director of the Institute for Fusion Studies (IFS) of The University of Texas at Austin. The Japanese co-chairman is the director of the Theory and Computer Simulation Center at the National Institute for Fusion Studies. 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 representing a spectrum of US universities and national laboratories. The names of the persons on the Steering Committee and the names of the Advisors are listed below:

JIFT Steering Committee

US Members	*Japanese Members*
J. Van Dam (IFS)—Co-Chairman	M. Okamoto (NIFS)—Co-Chairman
F. Waelbroeck (IFS)—Co-Exec. Secretary	R. Horiuchi (NIFS)—Co-Exec. Secretary
J. Leboeuf (UCLA)	Z. Yoshida (Tokyo U.)
M. Crisp (DOE)	K. Mima (Osaka U.)

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), W. Horton (IFS), W. Tang (PPPL), and P. Terry (UWM)

Last year we reported that Dr. Masahiro Wakatani, a member of the JIFT Steering Committee for over ten years, had unexpectedly passed away in January 2003. The JIFT Steering Committee helped write an obituary in his memory, which was published in *Physics Today* [November 2003, pp. 91-92]. Also, the US co-chairman presented a special memorial talk about Dr. Wakatani at the 13th International Toki Conference (December 2003), which will be published in the Journal of Plasma and Fusion Research.

The JIFT Steering Committee attempts to schedule workshops in such a way as to dovetail with other meetings. It also tries 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.

Note that information about the JIFT program, including annual schedules of exchange activities, can be found on the new JIFT web site at http://peaches.ph.utexas.edu/jift/.

6. *PLANS FOR FUTURE ACTIVITIES (PROPOSED 2004-2005 PROGRAM)*

The topics and themes of the exchange activities that have been proposed for the next year (April 1, 2004–March 31, 2005) are consistent with the traditional emphasis of JIFT on fundamental theoretical plasma physics issues. At the same time the proposed activities have direct relevance to the fusion science programmatic interests of both countries. The schedule of proposed activities for the coming year (2004-2005) is listed below.

A. 2004-2005 Proposed Workshops

US to Japan:

Progress of Theoretical Analyses in Three dimensional Configuration
Organizers: Noriyoshi Nakajima (NIFS) and Donald Monticello (PPPL)
Proposed Place/Time: Kyoto, Japan; November 2004

Theory and Simulation Research on Ultra-Intense EM Field Interaction with Plasmas
Organizers: Kunioka Mima (Osaka U) and Yasuhiko Sentoku (U. Nevada-Reno)
Proposed Place/Time: Kyoto, Japan; April 2005

Japan to US:

Physics of Energetic Particles
Organizers: Guoyong Fu (PPPL) and Yasushi Todo (NIFS)
Proposed Place/Time: Princeton, NJ; March 2005

Theory-Based Modeling and Integrated Simulation of Burning Plasma (II)
Organizers: Steven Jardin (PPPL), and Atushi Fukuyama (Kyoto U.)
Proposed Place/Time: Princeton, NJ; September 2004

JIFT Steering Committee Meeting
Organizers: James Van Dam (IFS) and Masao Okamoto (NIFS)
Proposed Place/Time: Savannah, GA; November 2004

B. 2004-2005 Proposed Exchange Visits

Japan to US:

Particle Simulation in Open Systems
Seiji Ishiguro NIFS), Visiting Professor
IFS; November 2004 (one month); paid by US

Large Amplitude Plasma Waves and Particle Acceleration
Yukiharu Ohsawa (Nagoya U), Visiting Scientist
UCLA; August 2004 (one month); paid by Japan

Analysis of Stabilities and Waves in Flowing Plasmas
Makoto Hirota (Tokyo U), Visiting Scientist
New York University; September–November 2004 (three months); paid by Japan

Simulation Study of Collisionless Driven Reconnection
Hiroaki Ohtani (NIFS), Visiting Scientist
PPPL; August 2004 (one month); paid by Japan

Atomic Processes in Fusion Reactor Edge Plasmas
Takako Kato (NIFS), Visiting Scientist
Sandia National Laboratory; June 6-11, 2004 (one week); paid by Japan

POTENTIAL ADDITIONAL VISITS:

Simulation Study of RF Heating and Energetic Particle Transport
Sadayoshi Murakami (Kyoto U), Visiting Scientist
General Atomics; July 2004 (3 weeks); paid by Japan

Simulation Study of Energetic Particle Driven MHD Modes
Yasushi Todo (NIFS), Visiting Scientist
IFS; December 2004 (two weeks); paid by Japan

US to Japan:

Two-Fluid Plasma Models with Mass Flow
Eliezer Hameiri (NYU), Visiting Professor
NIFS; May 2004 (three months); paid by Japan

MHD Theory on the Resistive Wall Mode
Ming-Sheng Chu (General Atomics), Visiting Professor
NIFS; September 2004 (three months); paid by Japan

MHD Stability Calculations for LHD
Benjamin Carreras (ORNL), Visiting Scientist
NIFS; December 2-15, 2004 (two weeks); paid by US

Analysis of Micro-instability in LHD and JT-60U Plasmas
Greg Rewoldt (PPPL), Visiting Scientist
NIFS and JAERI; summer 2004 (two weeks); paid by US

POTENTIAL ADDITIONAL VISIT:

MHD Stability of LHD: Comparison of Ballooning and Global Mode Theory with Experiment
Stuart Hudson (PPPL), Visiting Scientist
NIFS; September 2004 (two weeks); paid by US

C. 2004-2005 Proposed Joint Computational Projects

Large Scale Simulation on Helical Plasma Physics
K. Ichiguchi, T. Hayashi, N. Nakajima (NIFS); B. Carreras (ORNL); L. Sugiyama (MIT); S. Hudson (PPPL)
1 week; 1 person to Japan
1 week; 1 person to US

Development of a Numerical Analysis Method of the Drift Kinetic Equation by Monte Carlo Method
S. Murakami (Kyoto U.); V. S. Chan, M. Choi, L. Lao (GA)
1 week; 1 person to Japan

Physics of Energetic Particles in Fusion Plasmas
Y. Todo (NIFS); H. L. Berk, B. N. Breizman, J. W. Van Dam (IFS)
1 week; 1 person to Japan

Particle Simulation in Open Systems
S. Ishiguro, R. Horiuchi, H. Ohtani (NIFS); J. N. Leboeuf, V. K. Decyk (UCLA)
1 week; 1 person to Japan
1 week; 1 person to US

Drift Mode Analyses for the Large Helical Device
N. Nakajima, H. Yamada (NIFS); G. Rewoldt, G. Y. Fu (PPPL)
1 week; 1 person to Japan

CONTINUED FROM 2003-04:

Gyrokinetic Transport Simulation
V. Decyk, R. Sydora (UCLA), W. Lee (PPPL);
T. Takayama (NIFS), H. Naitou (Yamaguchi)
2 weeks; 1 person to Japan; continued from 2002-2003

Plasma Rotation, Vortices, and Anomalous Transport
W. Horton, A. Aydemir (IFS), B. Carreras (ORNL);
M. Okamoto, H. Sugama (NIFS), S. Murakami (Kyoto)
3 weeks; 1 person to Japan; continued from 2002-2003

MHD Stability in Advanced Tokamaks
M. Ozeki, Y. Ishii (JAERI), Y. Tomita (NIFS);
J. Manickam (PPPL), A. Aydemir (IFS)
1 week; 1 person to US; continued from 2002-2003

New Simulation Algorithms for Massively Parallel Processing
V. Decyk (UCLA), W. Tang (PPPL);
K. Watanabe, R. Horiuchi, S. Ishiguro (NIFS)
2 weeks; 1 person to US; continued from 2002-2003

Toroidal Simulation and Plasma Transport Modeling
W. Horton (IFS);
Y. Kishimoto, A. Azumi (JAERI), H. Takamaru (NIFS)

1 week; 1 person to US; continued from 2002-2003

Numerical Study of High Energy Particle Effect on MHD Stability
C.Z. Cheng (PPPL), J. Van Dam (IFS);
M. Azumi, T. Ozeki (JAERI), Y. Todo (NIFS)
1 week; 1 person to US; continued from 2002-2003

Turbulent Transport Applications to Tokamaks and Helical Systems
B. Carreras (ORNL); W. Horton (IFS)
Y. Nakamura (Kyoto); M. Yokoyama (NIFS)
1 week; 1 person to US; continued from 2002-2003

Tokamak Simulation on Massively Parallel Computers
B. Carreras, D. Spong (ORNL), J.N. Leboeuf, V. Decyk (UCLA);
S. Tokuda, F. Kurita (JAERI), T. Watanabe (NIFS)
1 week; 1 person to US; continued from 2002-2003

MHD and Transport Phenomena in Toroidal Systems
W. Tang, G. Rewoldt, C.Z. Cheng (PPPL);
H. Sugama, R. Ishizaki (NIFS)
1 week; 1 person to US; continued from 2002-2003

Kinetic Effects on MHD Phenomena
J. Van Dam, H. Berk (IFS);
M. Okamoto, N. Nakajima, K. Ichiguchi (NIFS)
1 week; 1 person to US; continued from 2002-2003

Benchmarking Kinetic Stability Code for Toroidal Devices
G. Rewoldt (PPPL);
Y. Idomura (JAERI), A. Fukuyama (Kyoto)
8 weeks; 1 person to US; new