

# CONTENTS OF VOLUME 1

## ARTSIMOVICH MEMORIAL LECTURE AND TOROIDAL CONFINEMENT SYSTEMS (Sessions A1 to A6)

<i>Artsimovich Memorial Lecture: The role of innovations in fusion research</i> (IAEA-CN-60/A-0) .....	3
<i>D.D. Ryutov</i>	

## TOROIDAL CONFINEMENT SYSTEMS OVERVIEW (Session A1)

Review of recent D-T experiments from TFTR (IAEA-CN-60/A1-1) .....	11
<i>R.J. Hawryluk et al.</i>	
Discussion .....	29
Recent JT-60U results towards steady state operation of tokamaks (IAEA-CN-60/A1-2) .....	31
<i>JT-60 Team</i>	
Discussion .....	49
The new experimental phase of JET and prospects for future operation (IAEA-CN-60/A1-3) .....	51
<i>JET Team</i>	
Discussion .....	80
DIII-D program overview (IAEA-CN-60/A1-4) .....	83
<i>DIII-D Team</i>	
Discussion .....	103
Recent results on TORE SUPRA (IAEA-CN-60/A1-5) .....	105
<i>Equipe TORE SUPRA</i>	
Discussion .....	122
Overview of recent results from Alcator C-Mod (IAEA-CN-60/A1-6) .....	123
<i>M. Porkolab et al.</i>	
Discussion .....	134
ELM control and boundary plasma modification in the JFT-2M tokamak (IAEA-CN-60/A1-7) .....	137
<i>H. Tamai et al.</i>	
Discussion .....	143
Transport investigations in the Wendelstein 7-AS stellarator (IAEA-CN-60/A1-8) .....	145
<i>G. Kühner et al.</i>	
Discussion .....	154

### EDITORIAL NOTE

The Proceedings have been edited by the editorial staff of the IAEA to the extent considered necessary for the reader's assistance. The views expressed remain, however, the responsibility of the named authors or participants. In addition, the views are not necessarily those of the governments of the nominating Member States or of the nominating organizations.

Although great care has been taken to maintain the accuracy of information contained in this publication, neither the IAEA nor its Member States assume any responsibility for consequences which may arise from its use.

The use of particular designations of countries or territories does not imply any judgement by the publisher, the IAEA, as to the legal status of such countries or territories, of their authorities and institutions or of the delimitation of their boundaries.

The mention of names of specific companies or products (whether or not indicated as registered) does not imply any intention to infringe proprietary rights, nor should it be construed as an endorsement or recommendation on the part of the IAEA.

The authors are responsible for having obtained the necessary permission for the IAEA to reproduce, translate or use material from sources already protected by copyrights.

Material prepared by authors who are in contractual relation with governments is copyrighted by the IAEA, as publisher only to the extent permitted by the appropriate national regulations.

Recent results of ECRH and ECCD on T-10 tokamak (IAEA-CN-60/A1-9) .....	157	TAE and MHD activity in TFTR DT plasmas (IAEA-CN-60/A2-10) .....	275
<i>V.V. Alikaev et al.</i>		<i>E.D. Fredrickson et al.</i>	
Discussion .....	167	Discussion .....	287
<b>CORE PLASMA PHYSICS (Session A2)</b>		Tritium transport and influx, and helium ash measurements on TFTR during DT operation (IAEA-CN-60/A2-11) .....	289
Fusion power production in TFTR (IAEA-CN-60/A2-1) .....	171	<i>P.C. Efthimion et al.</i>	
<i>M.G. Bell et al.</i>		Discussion .....	304
Discussion .....	182	Studies of energy and particle transport in JET (IAEA-CN-60/A2-12) .....	307
Heating and transport in TFTR D-T plasmas (IAEA-CN-60/A2-2) .....	183	<i>JET Team</i>	
<i>M.C. Zarnstorff et al.</i>		Discussion .....	317
Discussion .....	197	Experimental constraints on transport (IAEA-CN-60/A2-13) .....	319
Improved confinement and transport barrier in the JT-60U high $\beta_p$ H mode (IAEA-CN-60/A2-3) .....	199	<i>T.C. Luce et al.</i>	
<i>Y. Koide et al.</i>		Discussion .....	330
Discussion .....	210	Transport and improved confinement in high power edge radiation cooling experiments on TEXTOR (IAEA-CN-60/A2-14) .....	333
Operation for high performance in the new JET configuration (IAEA-CN-60/A2-4) .....	211	<i>A.M. Messiaen et al.</i>	
<i>JET Team</i>		Discussion .....	339
Discussion .....	220	Transport and turbulence in Tore Supra (IAEA-CN-60/A2-15) .....	341
H-mode and VH-mode confinement improvement in DIII-D: Investigations of turbulence, local transport and active control of the shear in the $E \times B$ flow (IAEA-CN-60/A2-5) .....	221	<i>X. Garbet et al.</i>	
<i>K.H. Burrell et al.</i>		Discussion .....	347
Discussion .....	238	Study of turbulence and plasma potential in the JIPPT-IIU tokamak (IAEA-CN-60/A2-16) .....	349
The H-mode in ASDEX Upgrade: Physics and operating regimes (IAEA-CN-60/A2-6) .....	241	<i>Y. Hamada et al.</i>	
<i>W. Köppendörfer et al.</i>		Non-dimensional transport scaling and its correlation with local transport properties in JT-60U plasmas (IAEA-CN-60/A2-17) .....	355
Discussion .....	248	<i>H. Shirai et al.</i>	
A new way to achieve the H mode, and skin size electromagnetic turbulence and transport in the HT-6M limiter tokamak (IAEA-CN-60/A2-7) .....	249	Discussion .....	364
<i>J. Li et al.</i>		Control of error-field modes and ELMs in ITER-shaped plasmas in COMPASS-D (IAEA-CN-60/A2-18) .....	365
Discussion .....	254	<i>A.W. Morris et al.</i>	
The physics of L- and H-mode confinement in JET (IAEA-CN-60/A2-8) .....	255	Discussion .....	373
<i>V.V. Parail et al.</i>		Control of the radial electric field in a toroidal plasma (IAEA-CN-60/A2-19) .....	375
Discussion .....	262	<i>K. Ida et al.</i>	
H mode of high toroidal field plasma in JT-60U (IAEA-CN-60/A2-9) .....	265	Discussion .....	380
<i>M. Sato et al.</i>		High beta experiments in CHS (IAEA-CN-60/A2-20) .....	381
Discussion .....	273	<i>S. Okamura et al.</i>	
		Discussion .....	388
		Global particle balance and local particle transport in the Frascati Tokamak Upgrade (IAEA-CN-60/A2-21) .....	389
		<i>F. Alladio et al.</i>	
		Discussion .....	396

Effect of toroidal field ripple on fast-ion loss in JT-60U (IAEA-CN-60/A2-22) .....	397
<i>Y. Kusama et al.</i>	
Discussion .....	403
Alfvén eigenmodes active excitation experiments in JET (IAEA-CN-60/A2-23) .....	405
<i>A. Fasoli et al.</i>	

### HEATING AND CURRENT DRIVE (Session A3)

High power lower hybrid current drive experiments in JT-60U (IAEA-CN-60/A3-1) .....	415
<i>Y. Ikeda et al.</i>	
Discussion .....	421
Lower hybrid current drive in JET and reactor applications (IAEA-CN-60/A3-2) .....	423
<i>JET Team</i>	
Discussion .....	429
ICRF heating of deuterium-tritium plasmas in TFTR (IAEA-CN-60/A3-3) .....	431
<i>G. Taylor et al.</i>	
Discussion .....	440
Mode conversion studies in TFTR (IAEA-CN-60/A3-4) .....	443
<i>R. Majeski et al.</i>	
Discussion .....	451
Comprehensive studies on second harmonic ICRF heating in JT-60U (IAEA-CN-60/A3-5) .....	453
<i>M. Saigusa et al.</i>	
Discussion .....	460
High power fast wave direct electron heating and current drive on Tore Supra (IAEA-CN-60/A3-6) .....	461
<i>Equipe Tore Supra</i>	
Discussion .....	468
Formation of core transport barrier and CH-mode by ion Bernstein wave heating in PBX-M (IAEA-CN-60/A3-7) .....	469
<i>M. Ono et al.</i>	
Discussion .....	479
Plasma filamentation and first results of 110 GHz ECH in the RTP tokamak (IAEA-CN-60/A3-8) .....	481
<i>A.A.M. Oomens et al.</i>	

### DIVERTOR AND EDGE PHYSICS (Session A4)

Divertor characteristics during high density H mode discharges in ASDEX Upgrade (IAEA-CN-60/A4-1) .....	491
<i>M. Kaufmann et al.</i>	
Discussion .....	498
Divertor research on the DIII-D tokamak (IAEA-CN-60/A4-2) .....	499
<i>D.N. Hill et al.</i>	
Discussion .....	513
Heat and particle transport in the divertor and remote radiative cooling on JT-60U (IAEA-CN-60/A4-3) .....	515
<i>N. Asakura et al.</i>	
Discussion .....	526
Exhaust and impurity control experiments in the JET pumped divertor (IAEA-CN-60/A4-4) .....	527
<i>JET Team</i>	
Discussion .....	539
Modelling and measurements of JET divertor plasmas (IAEA-CN-60/A4-5) .....	541
<i>JET Team</i>	
Discussion .....	551
Performance of the Alcator C-Mod closed divertor in ohmically heated plasmas (IAEA-CN-60/A4-6) .....	553
<i>J.L. Terry et al.</i>	
Discussion .....	557
Boundary layer and H-mode studies in W7-AS (IAEA-CN-60/A4-7) .....	559
<i>F. Wagner et al.</i>	
Discussion .....	567
Control of edge turbulence in PBX-M and TEXT-U (IAEA-CN-60/A4-8) .....	569
<i>R.D. Bengtson et al.</i>	
Discussion .....	574
Observation of turbulence suppression and transport reduction in the presence of sheared flow (IAEA-CN-60/A4-9) .....	575
<i>H. Toyama et al.</i>	
Discussion .....	581
Studies of intermittency and edge turbulence in ADITYA (IAEA-CN-60/A4-10) .....	583
<i>R. Jha et al.</i>	
Biased divertor performance under LH current drive and heating conditions on the TdeV tokamak (IAEA-CN-60/A4-11) .....	593
<i>R. Décoste et al.</i>	
Discussion .....	600

Radiative layer experiments with an ergodized boundary in Tore Supra (IAEA-CN-60/A4-12) .....	601
<i>Equipe Tore Supra</i>	
Discussion .....	605

## CONCEPT OPTIMIZATION (Session A5)

The role of shaping in achieving high performance in DIII-D (IAEA-CN-60/A5-1) .....	609
<i>E.A. Lazarus et al.</i>	
Discussion .....	626
Variable configuration plasmas in TCV (IAEA-CN-60/A5-2) .....	627
<i>J.B. Lister et al.</i>	
Discussion .....	632
Development of advanced tokamak scenarios based on high bootstrap currents in JET (IAEA-CN-60/A5-3) .....	633
<i>JET Team</i>	
Discussion .....	640
Non-inductive current drive experiments for profile control in JT-60U (IAEA-CN-60/A5-4) .....	641
<i>S. Ide et al.</i>	
Discussion .....	650
Steady state high performance in JT-60U (IAEA-CN-60/A5-5) .....	651
<i>Y. Kamada et al.</i>	
Discussion .....	660
Deuterium-tritium TFTR plasmas in the high poloidal beta regime (IAEA-CN-60/A5-6) .....	663
<i>S.A. Sabbagh et al.</i>	
Discussion .....	673
Disruptions in vertically elongated ASDEX Upgrade plasmas (IAEA-CN-60/A5-7) .....	675
<i>O. Gruber et al.</i>	
Discussion .....	683
Disruption amelioration experiments in JT-60U and JET (IAEA-CN-60/A5-8) .....	685
<i>R. Yoshino et al.</i>	
Discussion .....	695
Disruption control by ECH in the JFT-2M tokamak (IAEA-CN-60/A5-9) .....	697
<i>K. Hoshino et al.</i>	
Discussion .....	703

Wall stabilization of rotating high beta discharges in DIII-D (IAEA-CN-60/A5-10) .....	705
<i>A.D. Turnbull et al.</i>	
Discussion .....	717
The START spherical tokamak (IAEA-CN-60/A5-11) .....	719
<i>A. Sykes et al.</i>	
Discussion .....	724
Formation and sustainment of a low aspect ratio tokamak by coaxial helicity injection (IAEA-CN-60/A5-12) .....	725
<i>T.R. Jarboe et al.</i>	
Discussion .....	735
Exploration of low-aspect-ratio tokamak regimes in the CDX-U and TS-3 devices (IAEA-CN-60/A5-13) .....	737
<i>Y.S. Hwang et al.</i>	

## HELICAL SYSTEM PHYSICS (Session A6)

Initial operation of the TJ-IU torsatron and theoretical studies for the flexible heliac TJ-II (IAEA-CN-60/A6-1) .....	749
<i>E. Ascasibar et al.</i>	
Discussion .....	756
Confinement studies of plasmas in Heliotron E with boronization (IAEA-CN-60/A6-2) .....	757
<i>T. Obiki et al.</i>	
Discussion .....	769
Perturbative and stationary ECRH and ECCD experiments with 70 and 140 GHz at the W7-AS stellarator (IAEA-CN-60/A6-3) .....	771
<i>V. Erckmann et al.</i>	
Discussion .....	781
ICRF heating in CHS (IAEA-CN-60/A6-4) .....	783
<i>K. Nishimura et al.</i>	
Discussion .....	788
Pressure and energetic particle destabilized global MHD modes in the stellarator W7-AS (IAEA-CN-60/A6-5) .....	791
<i>A. Weller et al.</i>	
Discussion .....	796
Viscosity and ion-neutral effects on plasma rotation in stellarators (IAEA-CN-60/A6-6) .....	797
<i>J.N. Talmadge et al.</i>	
Discussion .....	807
Chairmen of Sessions and Secretariat of the Conference .....	809