

JT-60SA リサーチプランと研究活動  
 JT-60SA Research Plan and Research Activities

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< JT-60SA Research Plan >

The ‘JT-60SA Research Plan’ summarizes research objectives and strategy in JT-60SA experiments covering all the major research fields contributing to ITER and DEMO. The document consists of following chapters (= research fields) after introduction (Chap. 1) [1].

- Chap. 2: Research Strategy
- Chap. 3: Operation Regime Development
- Chap. 4: MHD Stability and Control
- Chap. 5: Transport and Confinement
- Chap. 6: High Energy Particle Behavior
- Chap. 7: Pedestal and Edge Characteristics
- Chap. 8: Divertor, SOL and PMI
- Chap. 9: Fusion Engineering
- Chap. 10: Theoretical models and simulation codes

The research plan has been discussed in the fusion communities in Japan and Europe to deepen and sharpen the research strategy of JT-60SA. Research items for critical issues in ITER and DEMO that should be solved in JT-60SA are proposed from over than 300 colleagues in JA and EU.

The purpose of discussing the JT-60SA Research Plan is to mature the Research Plan itself and to encourage fusion studies for JT-60SA, ITER and DEMO.

< Structure and Status >

At present, the EU and JA Integrated Project Team of the Satellite Tokamak Project, EFDA and Fusion Energy Forum Japan are collaborating as JT-60SA Research Unit for development of the research plan (Fig. 1). A total of 332 scientists are joining the research plan activity; 145 in JA (73 JAEA, 72 JA-Universities from 14 institutes), 182 in EU (10 countries, 23 institutes) and 5 in the Project Team. The JA and EU Technical Responsible Officers (TROs) lead the discussion on the research plan and related collaborative works in their research fields (Fig. 2). Proposals and comments from JA and EU are, respectively organized by JA and EU TROs.

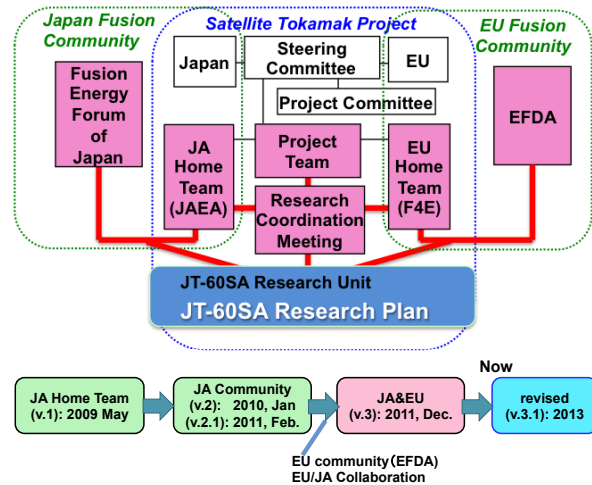


Fig.1 Structure and progress of broad discussion on the JT-60SA Research Plan in EU and JA.

	JAEA TROs	JA University	EU TROs
<b>Chapter 2:</b> Research Strategy	Y. Kamada	Y. Takase (Tokyo-U)	D. Borba (EFDA)
<b>Chapter 3:</b> Operation Regime Development	T. Suzuki	K. Nagasaki (Kyoto-U)	E. Joffrin (CEA)
<b>Chapter 4:</b> MHD Stability and Control	G. Matsunaga	M. Furukawa (Tottori-U)	T. Bolzonella (RFN)
<b>Chapter 5:</b> Transport and Confinement	M. Yoshida	K. Tanaka (NIFS)	M. Romanelli (CCFE)
<b>Chapter 6:</b> High Energy Particle Behavior	K. Shinohara	M. Osakabe (NIFS)	P. Lauber (IPP)
<b>Chapter 7:</b> Pedestal and Edge Characteristics	H. Urano	T. Morisaki (NIFS)	M. Beurskens (CCFE)
<b>Chapter 8:</b> Divertor, SOL and PMI	T. Nakano	M. Sakamoto (Tsukuba-U)	M. Wischmeier (IPP)
<b>Chapter 9:</b> Fusion Engineering	M. Enoeda S. Sakurai	A. Sagara (NIFS)	C. Day (KIT)
<b>Chapter 10:</b> Theoretical models and simulation codes	N. Hayashi	A. Fukuyama (Kyoto-U)	G. Giruzzi (CEA)
JT-60SA Research Plan organization	Y. Kamada		G. Giruzzi (CEA)
JT-60SA Research Plan coordination	M. Yoshida		G. Giruzzi (CEA)

Fig. 2 EU and JA Technical Responsible Officers (TROs) for JT-60SA Research Plan.

The JA and EU TROs discuss proposals from each side and add the approval contents in the chapters.

The Research Coordination Meetings (RCM) with the members of the JT-60SA Research Unit, including the Technical Responsible Officers (TROs) of the JT-60SA Research Plan, are held at the JAEA Naka Fusion Institute. The meetings are mainly organized in two parts. One is a review and revision of the JT-60SA Research Plan and the other is information exchange on scientific research activities: results from collaborative works on JT-60SA, current observations in present tokamaks, ITER and DEMO requests. The RCM places emphasis on discussion and information exchange not only between the JA and EU TROs in each chapter but over the chapters in order to realize fruitful and efficient work. The 1<sup>st</sup> and 2<sup>nd</sup> meetings were held in October 2011 and May 2013. We will have the 3<sup>rd</sup> meeting in May 2014.

The JT-60SA Research Plan ver. 3.0 was published as the first JA-EU collaboration version on 22th December 2011. Many proposals from EU were added: hybrid scenario, option of tungsten divertor, mitigation of MHD instabilities, particle transport and fueling and so on. The revised version ver. 3.1 will be completed around the end of 2013.

**<Research Activities>**

The base of the JT-60SA research plan (ver. 3.0) was made as mentioned above. The next step is to specify the research proposal, for example target plasmas, experimental conditions, actuators,

diagnostics, etc.

For this purpose, substantial progress has been made in developing some simulation codes and validating transport models through the JA and EU, and JA-University and JAEA collaborations. Also designs of heating and pumping systems are discussed to optimize the spec. Feasibility studies of some diagnostics are conducted in both JA and EU. The main results were summarized and reported in the international conferences; the EPS conference (4 papers), the EC-17 conference (1 paper), and the IAEA Fusion Energy Conference (3 papers), Toki conference (1 paper) in 2012.

**<Future Plan>**

The JT-60SA Research Plan will be updated until the first plasma considering the ITER research Plan, DEMO issues and schedule, results in the present machines. We will continue to develop the research plan by specifying the proposed research items using simulation codes and models. And then, the research items will be prioritized using the results (Fig. 3).

In 2013, various collaborative studies on JT-60SA are proposed and conducted: code and model validations, simulations, feasibility studies of diagnostics, heatings and pumping. It is expected that more and more scientists are joining “the studies on JT-60SA” with their specialities. The results will realize fruitful experiments in JT-60SA and generate important message to ITER and DEMO.

**JT-60SA Research Plan development**

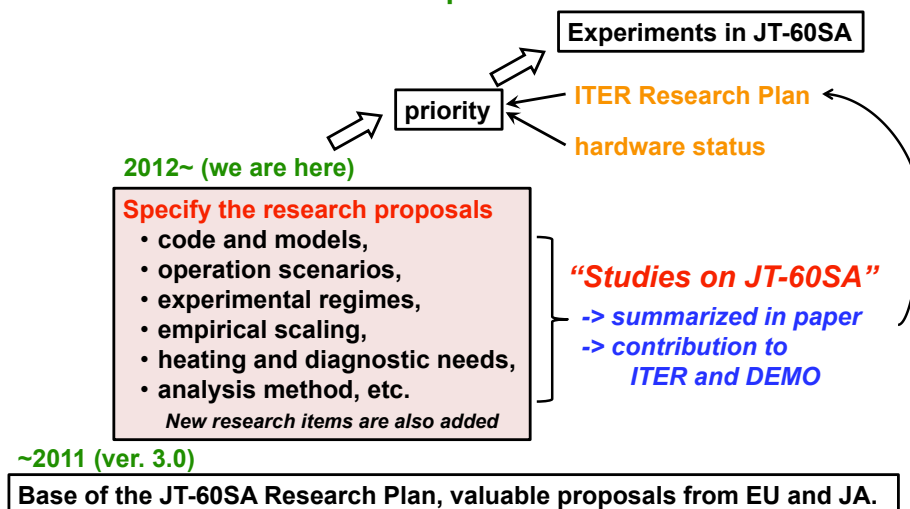


Fig. 3 Steps of the JT-60SA Research Plan toward experiments.

[1] JT-60SA Research Plan version 3.0 can be downloaded from  
 English: [http://www.jt60sa.org/b/index\\_nav\\_3.htm?n3/operation.htm](http://www.jt60sa.org/b/index_nav_3.htm?n3/operation.htm)  
 Japanese: [http://www-jt60.naka.jaea.go.jp/jt60/html/res\\_plan\\_jt60sa.html](http://www-jt60.naka.jaea.go.jp/jt60/html/res_plan_jt60sa.html)