



IAEA FEC 2016

Contribution ID: 271

Type: Overview Poster

Overview of SST-1 Up-gradation & Recent Experiments in SST-1

Monday, 17 October 2016 14:00 (4h 45m)

Steady State Superconducting Tokamak (SST-1) is a 'operational' experimental superconducting device since late 2013. Since last IAEA-FEC, SST-1 has been upgraded with Plasma Facing Components being installed and integrated in the vacuum vessel and is getting prepared towards long pulse operations in both circular and elongated configurations. The PFC integration has been completed in August 2015 and initial experiments have begun in SST-1 with circular plasma configurations. SST-1 offers a unique possibility of investigating long pulse discharges with large aspect ratio (> 5.5) compared to contemporary devices. Presently, SST-1 standard ohmic discharges are in excess of 100 KA with typical core density $\sim 2 \times 10^{19} \text{ m}^{-3}$ and core electron temperatures $\sim 500 \text{ eV}$ having duration in excess of 300 ms. A 42 GHz ECR pre-ionization source at $\sim 150 \text{ KW}$ in 1.5 T central field breaks down the gas, the current starts up at $\sim 1.3 \text{ MA/s}$ in 60-80 ms in an induced field of $\sim 0.3 \text{ V/m}$. These standard discharges demonstrate copious saw teething and MHD activities as the pulse progresses including NTM, mode locking and MHD characteristics. PFC equipped SST-1 has completed these basic experimental studies confirmed with simulations. These includes eddy currents influencing the NULL dynamics, field errors, equilibrium index evolutions, wall influencing plasma characteristics, plasma positions, plasma rotational and Tearing Mode characteristics including the island width and island growths etc. Presently, SST-1 is attempting at multi second long high aspect ratio plasma discharges by coupling the Lower Hybrid with the Ohmic plasma as well as with robust real time position and density controls.

SST-1 device has been upgraded with a pair of internal coil aimed at effective fast plasma control and a pair of segmented coil aimed at controlling some of the rotational aspects of plasma including the RMPs and ELMs. Supersonic Molecular Beam Injection (SMBI) from both high field and low field sides and Pellets Injection Systems have also been added with several edge plasma diagnostics aimed at both density control and edge plasma turbulence studies.

The up-gradation details including the planned ones, salient early plasma characteristics in large aspect ratio PFC equipped SST-1 plasma and future experimental plans towards long pulse operations in SST-1 will be elaborated in this paper.

Paper Number

OV/4-3Ra

Country or International Organization

India

Primary author: Dr PRADHAN, Subrata (Institute for Plasma Research)

Co-authors: Mr VARADHARAJULU, A (Institute for Plasma Research); Dr SHARMA, Aashoo N (Institute for Plasma Research); Prof. KUMAR, Ajai (Institute for Plasma Research); Mr KUMAR, Ajay (Institute for Plasma Research)

Research); Mr SINGH, Akhilesh K (Institute for Plasma Research); Mr OJHA, Amit (Institute for Plasma Research); Prof. DAS, Amita (Institute for Plasma Research); Mr PANCHAL, Arun G (Institute for Plasma Research); Mr A, Arun Prakash (Institute for Plasma Research); Mr THAKUR, Arvinkumar L (Institute for Plasma Research); Mrs ADHIYA, Asha N (Institute for Plasma Research); Mr SHARMA, Atish L (Institute for Plasma Research); Mr GARG, Atul (Institute for Plasma Research); Mr KUMAR, Aveg (Institute for Plasma Research); Mr MAKWANA, Azadsinh R (Institute for Plasma Research); Mr PRAGHI, Bhadrash R (Institute for Plasma Research); Mrs CHAUDHARI, Bhumi (Institute for Plasma Research); Mr SHUKLA, Braj Kumar (Institute for Plasma Research); Mr GUPTA, Chet Narayan (Institute for Plasma Research); Mr VIRANI, Chetan G (Institute for Plasma Research); Dr RAJU, Daniel (Institute for Plasma Research); Mr SONARA, Dashrath P (Institute for Plasma Research); Mr GHOSH, Debashis (Institute for Plasma Research); Mr KANABAR, Devenkumar H (Institute for Plasma Research); Prof. BORA, Dhiraj (Institute for Plasma Research); Mr CHRISTIAN, Dikens R (Institute for Plasma Research); Mr RAVAL, Dilip C (Institute for Plasma Research); Mr SHARMA, Dinesh Kumar (Institute for Plasma Research); Mr PATHAN, Firozkhan S (Institute for Plasma Research); Mr SRIKANTH, G L N (Institute for Plasma Research); Mr BABU, Gattu Ramesh (Institute for Plasma Research); Mr MAHSURIA, Gaurang I (Institute for Plasma Research); Mr MASAND, Harish (Institute for Plasma Research); Mr NIMAVAT, Hiren D (Institute for Plasma Research); Mr CHUDASMA, Hitesh H (Institute for Plasma Research); Mr GULATI, Hitesh Kumar (Institute for Plasma Research); Mr PATEL, Hitesh S (Institute for Plasma Research); Mr MANSURI, Imran A (Institute for Plasma Research); Mr PATEL, J C (Institute for Plasma Research); Mr DHONGDE, Jasraj R (Institute for Plasma Research); Mr RAVAL, Jayesh V (Institute for Plasma Research); Mr THOMAS, Jinto (Institute for Plasma Research); Mr DOSHI, Kalpesh J (Institute for Plasma Research); Mr DHANANI, Kalpeshkumar R (Institute for Plasma Research); Mr PATEL, Ketan M (Institute for Plasma Research); Mr PATEL, Kirankumar G (Institute for Plasma Research); Mr AMBULKAR, Kirankumar K (Institute for Plasma Research); Mr PATEL, Kiritkumar B (Institute for Plasma Research); Mrs MAHAJAN, Kirti (Institute for Plasma Research); Mrs ASUDANI, Kumudni (Institute for Plasma Research); Mr GOPALAKRISHNA, M V (Institute for Plasma Research); Mrs SHARMA, Manika (Institute for Plasma Research); Mrs BHANDARKAR, Manisha K (Institute for Plasma Research); Dr KUMAR, Manoj (Institute for Plasma Research); Mr KHAN, Mohammad Shoab (Institute for Plasma Research); Mrs BANAUDHA, Moni (Institute for Plasma Research); Mr VORA, Murtuza M (Institute for Plasma Research); Mrs RAMAIYA, Nilam K (Institute for Plasma Research); Mr BAIRAGI, Nitin (Institute for Plasma Research); Mr MISHRA, Pabitra Kumar (Institute for Plasma Research); Mr VARMORA, Pankaj (Institute for Plasma Research); Mr SHAH, Pankilkumar (Institute for Plasma Research); Mr PATEL, Paresh J (Institute for Plasma Research); Mr ATREY, Parveen Kumar (Institute for Plasma Research); Mr BISWAS, Prabal (Institute for Plasma Research); Mr CHAUHAN, Pradeep K (Institute for Plasma Research); Mr PANCHAL, Pradip N (Institute for Plasma Research); Dr SHARMA, Pramod K (Institute for Plasma Research); Mr PARMAR, Pramod R (Institute for Plasma Research); Mr THANKEY, Prashant L (Institute for Plasma Research); Mrs SEMWAL, Pratibha (Institute for Plasma Research); Mr SANTRA, Prosenjit (Institute for Plasma Research); Dr SRINIVASAN, R (Institute for Plasma Research); Mr SHARMA, Rajiv (Institute for Plasma Research); Mrs KAUR, Rajwinder (Institute for Plasma Research); Mr PATEL, Rakeshkumar J (Institute for Plasma Research); Mrs MANCHANDA, Ranjana (Institute for Plasma Research); Prof. JHA, Ratneshwar (Institute for Plasma Research); Mr PANCHAL, Rohitkumar N (Institute for Plasma Research); TEAM, SST-1 (Institute for Plasma Research); Mrs DALAKOTI, Saifali (Institute for Plasma Research); Mr KUMAR, Sameer (Institute for Plasma Research); Dr KULKARNI, Sanjay V (Institute for Plasma Research); Mr PUROHIT, Shishir (Institute for Plasma Research); Mr PANDYA, Shwetang N (Institute for Plasma Research); Mr GEORGE, Siju (Institute for Plasma Research); Mr JAYASWAL, Snehal P (Institute for Plasma Research); Mrs GUPTA, Snehlata (Institute for Plasma Research); Mr JANA, Subrata (Institute for Plasma Research); Mr PATHAK, Suraya Kumar (Institute for Plasma Research); Mr PAREKH, Tejas J (Institute for Plasma Research); Mr RAVAL, Tusharkumar Y (Institute for Plasma Research); Mr NAGORA, Umeshkumar C (Institute for Plasma Research); Mr PRASAD, Upendra (Institute for Plasma Research); Mr SIJU, Varsha (Institute for Plasma Research); Dr TANNA, Vipul L (Institute for Plasma Research); Mr CHAUDHARI, Vishnu K (Institute for Plasma Research); Mr JOISA, Y Shankara (Institute for Plasma Research); Mr KHRISTI, Yohan S (Institute for Plasma Research); Mr PARAVASTU, Yuvakiran (Institute for Plasma Research); Dr KHAN, Ziauddin (Institute for Plasma Research)

Presenter: Dr PRADHAN, Subrata (Institute for Plasma Research)

Session Classification: Overview Poster

Track Classification: OV - Overviews