

Current Activity on Applied Superconductivity and Cryogenics in India

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Abstract—Primarily two areas, where India is currently active in this field of applied superconductivity and cryogenics. One is cryogenic engine for Indian space programme and another one is Indigenous development of MRI. Indigenously developed CE 25 cryogenic upper stage with a thrust of 200 kN was used in the launch vehicle LVM3 for the successful mission of Chandrayan-3 in this year. Superconducting magnet of 1.5 Tesla with warm bore 70 cm and length 140 cm was developed and successfully tested at 4.2 K. Ministry has initiated with the Indian industry for mass scale production of Indian MRI. In addition to those national projects, Department of Atomic Energy is pursuing activities for Spallation Neutron Source based on RF superconducting cavity and superconducting tokamak based on Nb-Ti and Nb₃Sn superconducting magnet. Many associated research and development activities have been initiated for the success of accelerator and plasma fusion reactor programme. India is also participating in International Programme like ITER. France, FAIR. Germany, PIP-II.USA and committed to have in-kind contribution. In recent past, ITER- India of IPR has successfully delivered the complex and compact cryo-line and valve boxes to France. Small scale feasibility study with HTS on Superconductivity for power application are being pursued at various academic institutes and scientific laboratories. Recently, Indian Government announced support on development of high-speed Quantum computer, where dilution refrigerator at milli kelvin temperature will play a key role. This talk will give a brief overview on present status and future plan on the above-mentioned project.

Keywords (Index Terms)—MRI, cryo engine, accelerator, ITER Tokamak, India