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Fusion R&D Activities at INEST

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China has long been actively performing the integrated studies not only on R&D for ITER, but on the future fusion reactor. Institute of Nuclear Energy Safety Technology (INEST), Chinese Academy of Sciences (CAS) concentrates on the nuclear technology and safety, especially related to innovative fusion reactor/blanket concepts, neutronics simulation and experiments, materials and blanket technology, fusion safety assessment and regulatory etc. In this paper, recent research progress on fusion nuclear technology and safety at INEST will be presented.

The Super Monte Carlo Program for Nuclear and Radiation Simulation (SuperMC) has been independently developed at INEST and has been widely used in more than 30 major international nuclear projects. The development of High Intensity D-T Fusion Neutron Generator (HINEG) has been launched by INEST. The first phase (HINEG-I) has been completed and commissioning with the intensity of the order of 10^(12) n/s, while the key components R&D of the second phase (HINEG-II) with the intensity of 10^(15)-10^(16) n/s is ongoing. China Low Activation Martensitic (CLAM) steel reached 6.4 tons industrial scale production, and is considered as the primary candidate for CN ITER-TBM. Meanwhile, joining and assembly techniques for CLAM steel were developed and a 1/3 scaled DFLL-TBM mockup was successfully fabricated. Dual coolant thermal hydraulic integrated experimental loop (DRAGON-V) is under construction to support the engineering design validation of PbLi breeder blanket with its parameters covering the design requirements of ITER-TBM. Moreover, INEST combining the domestic and international efforts to establish safety assessment methodology and safe design guideline for fusion energy development. In the recent research, the main scientific and technological safety gaps between the on-going ITER project and fusion demonstration reactor (DEMO) have been identified and the corresponding implications for the design and operation of DEMO are discussed.

Eligible for student paper award?

No

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