

16th IAEA Technical Meeting on Energetic Particles in Magnetic Confinement Systems - Theory of Plasma Instabilities

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1 MeV triton confinement study on KSTAR

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The behavior of 1 MeV triton in KSTAR deuterium plasma is studied using triton burnup neutron (TBN) diagnostics and classical burnup calculation code. In KSTAR, TBN is measured by neutron activation system (NAS) and scintillation detectors. Shot-integrated TBN yield is evaluated by NAS with silicon sample. Two kinds of scintillation detectors, stilbene and scintillating-fiber detectors, provide TBN emission rate. Measured TBN emission is analyzed using classical burnup calculation code. The code evaluates expected TBN emission by considering prompt loss rate and Coulomb drag in certain plasma condition. The amount of prompt loss is statistically evaluated using full orbit following code LORBIT. In addition to prompt loss and Coulomb drag, finite confinement time effect can be considered by volume averaged effective diffusion coefficient. Measured and calculated TBN emission are compared in two timing of Alfvén eigenmodes control experiment, with and without Alfvénic activity. Without Alfvénic activity, calculated TBN generally matched with measured value within experimental error. During the Alfvénic activity however, measured value is about half of the calculated value. The amount of confinement degradation due to Alfvénic activity is estimated in terms of volume averaged effective diffusion coefficient.

Country or International Organization

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