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2.8 Velocity-space sensitivity of the time-of-flight neutron spectrometer of EAST deuterium plasmas

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Self-sustaining fusion plasmas must be maintained by the power transfer from fusion born alpha particles to the thermal plasmas during slowing down process. Thus, the confinement of energetic alpha particles is crucial for a thermonuclear reactor in the future. The fast ions are primarily generated by applying auxiliary heating systems such as neutral beam injection and ion cyclotron resonance heating in current experiments. The information of the fast ions can be accessed by different fast-ion diagnostic systems. The velocity-space sensitivities of fast-ion diagnostics are given by so-called weight functions. The Time-Of-Flight Enhanced Diagnostics (TOFED) neutron spectrometer has been installed at EAST tokamak to perform advanced neutron emission spectroscopy (NES) diagnosis of deuterium plasmas. Here, instrument-specific weight functions of TOFED were presented by taking the instrumental response into account. The velocity-space sensitivity of a measured time-of-flight spectrum from TOFED can be directly determined by the calculated weight functions.

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