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TH/P3-27: Influence of Off-axis Neutral Beam Injection on Resistive Wall Mode Stability

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The stabilization of the resistive wall mode (RWM) is an essential issue for future magnetic fusion reactors (e.g. ITER) aiming at long-duration steady discharges over the no-wall beta limit. The RWM has been extensively investigated during recent years, both theoretically and experimentally. However, so far the physical mechanism of the passive control of the RWM has not been investigated fully, particularly the mechanism for the interaction between the RWM and energetic particles (EPs). Recent experiments in DIII-D indicate that the increase of the off-axis neutral beam injection (NBI) power can lead to the enhancement of RWM stability, which is opposite to expectation from consideration of the trapped particles fraction reduced by off-axis NBI. In this work, we apply our previous theory model to investigate the deposition effect of trapped EPs from off-axis NBI on the RWM instability. The results show that the spatial deposition effect of trapped EPs indeed significantly affects the RWM stability, and, compared with the on-axis case, off-axis deposition of EPs can contribute more stabilization to the RWM.

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