M3D-K Simulation of Beam-Driven Alfven Modes in DIIID

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Reversed shear Alfven eigenmodes (RSAEs) of toroidal number n=2 and n=3 are observed in DIIID plasmas with minimum safety factor value about q_{min}=4. M3D-K and NOVA simulations are carried to study beam-driven RSAEs and compare with the experimental results. We first benchmark M3D-K code with NOVA code using model equilibria for RSAEs in the MHD limit. It shows that M3D-K simulation results agree very well with NOVA results with respect to both mode frequencies and mode structure for a large range of q_{min} value. Second, we have carried out the benchmark studies for the DIIID discharge shot #142111. The M3D-K results also agree with that of NOVA in terms of mode frequency and mode structure. The mode frequency increases as the minimum safety factor decreases, which qualitatively shows the same trend as experiments. With energetic particles, the (n=2, m=8 and n=3, m=12) RSAEs are destabilized and the mode frequency, mode structure, and mode location is slightly shifted from the corresponding MHD results. More detailed comparisons between simulations and experiments will be further explored.