Abstract Submitted
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M3D-C1 modeling of pellet ELM triggering in low-collisionality discharges[1] ANDREAS WINGEN, ROBERT WILCOX, Oak Ridge National Lab, BRENDAN LYONS, General Atomics, LARRY BAYLOR, Oak Ridge National Lab, STEFFIE DIEM, UW-Madison, MORGAN SHAFER, DAISUKE SHIRAKI, Oak Ridge National Lab — Fully 3D nonlinear, as well as 2D linear M3D-C1 simulations are used to model ELM triggering by small pellets in the ITER relevant, peeling-limited pedestal stability regime. A critical pellet size threshold is found in both experiment and modeling depending on pedestal conditions, pellet velocity and injection direction. Using radial injection at the outboard midplane, the threshold is determined by M3D-C1 for multiple time slices of a DIII-D low-collisionality discharge that has pellet ELM triggering. Experimental observations show that a larger pellet size than the standard 1.3 mm diameter is necessary for ELM triggering; 1.8 mm pellets triggered several ELMs in cases where a smaller pellet failed. The M3D-C1 simulations are in reasonable agreement with these observations. While the 2D linear simulations give insight into the change of growth rates for various toroidal modes with pellet size, the 3D nonlinear simulations apply a pellet ablation model that mimics the actual injection with good match to the experiment.

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