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Gyrokinetic investigation of the ASDEX Upgrade I-mode pedestal KARL STIMMEL, ALEJANDRO BAN NAVARRO, TIM HAPPEL, DANIEL TOLD, TOBIAS GRLER, ELISABETH WOLFRUM, JAMES MARTIN COLLAR, RAINER FISCHER, PHILIP SCHNEIDER, FRANK JENKO, Max Planck Institute for Plasmaphysics Garching — Characterizing pedestal turbulence in the tokamak I-mode is a crucial step in understanding how particle and heat transport decouple during I-mode operation. This work models an ASDEX Upgrade I-mode discharge for the first time via linear and nonlinear gyrokinetic simulations with the GENE code. Experimental measurements from ASDEX-Upgrade discharge #30865 are used as simulation inputs for four scenarios at two pedestal locations and two time phases at 3.11 s and 3.80 s which correspond to L-mode and I-mode regimes. A microtearing mode which is absent in linear L-mode simulations is found in I-mode simulations at two radial positions, and ion-scale instabilities are characterized for all four scenarios linearly. Computed nonlinear heat flux values approach experimental measurements in three of the four cases, and heat transport is found to be dominated by ion-scale electrostatic turbulence. Electrostatic potential oscillation frequencies, as well as potential-temperature and potential-density crossphases are compared linearly and nonlinearly, and agreement is found at wavenumber ranges corresponding with peaks in the simulated heat flux spectra at one radial position for L-mode and I-mode.

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