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**Gyrokinetic particle simulation of global Alfvén modes in toroidal geometry** IGOR HOLOD, ZHIHONG LIN, YASUTARO NISHIMURA, University of California, Irvine — Global Alfvén modes are important for energy confinement studies, since they can resonantly interact with fusion alpha-particles. The electromagnetic version of GTC PIC code has been developed in order to be capable to describe these modes. In the code ions are treated kinetically, while electrons are adiabatic in the zeroth order of an expansion based on the smallness of electron-to-ion mass ratio. Toroidal coupling of different shear Alfvén modes leads to the appearance of gaps in the continuum frequency spectrum. Inside these gaps Toroidal Alfvén Eigenmodes (TAE) can exist. Keeping electromagnetic effects by taking into account magnetic field perturbations in the simulations, gives us a possibility to observe various Alfvén modes, in particular TAE. Starting with random perturbations of vector potential, the shear Alfvén modes die out due to the continuum damping and the distinctive peaks inside TAE frequency gaps are observed. Linear dispersion relation of the observed modes is compared with analytical theory to benchmark the simulations.

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