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Gyrokinetic δf particle simulation of energetic particles driven modes JIANYING LANG, YANG CHEN, SCOTT PARKER, University of Colorado at Boulder — The global GEM code [1] is reduced from a fully kinetic model with gyrokinetic ions and drift kinetic electrons to a hybrid model with gyrokinetic ions and massless fluid electrons to study the Toroidicity-Induced Alfven Eigenmodes (TAEs) at finite plasma pressure. This hybrid model can be further reduced to a two fluid model. Using a low-n global TAE as a test case [2], we observed the existence of a global discrete eigenmode in the two fluid simulation. The observed mode frequency is within the gap and close to the lower continuum which agrees well with the expected TAE frequency. A benchmark between the simulation and an eigenmode analysis based on the two fluid model is also accomplished. In the presence of the gyrokinetic hot ions, this TAE is driven unstable with the growth rate scaling linearly with the hot ion pressure β_{hot}. A mode rotation along the poloidal direction is also observed and the rotation direction depends on β_{hot}. Turning on the gyrokinetic bulk ions, we observed the growth rate of the unstable TAE being reduced, which is expected because of the kinetic damping effect. We are currently exploring the effects of different saturation mechanisms (wave trapping or mode-mode coupling). Results will be presented. [1] Y. Chen and S. Parker, J. of Comp. Phys. 220, 839 (2007). [2] G. Y. Fu and J. W. Van Dam, Phys. Fluids B 1, 1949 (1989).

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