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Toroidal Alfvénic Eigenmodes Driven by Energetic Particles with Maxwell and Slowing-down Distributions[1] YAWEI HOU, University of Science and Technology of China, PING ZHU, University of Science and Technology of China, University of Wisconsin-Madison, ZHIHUI ZOU, University of Science and Technology of China, CHARLSON C. KIM, SLS2 Consulting, ZHAOQING HU, ZHENGXIONG WANG, Dalian University of Technology — The energetic-particle (EP) driven toroidal Alfvén eigenmodes (TAEs) in a circular-shaped large aspect ratio tokamak are studied using the hybrid kinetic-MHD model in the NIMROD code, where the EPs are advanced using the δf particle-in-cell (PIC) method and their kinetic effects are coupled to the bulk plasma through moment closures. Two initial distributions of EPs, Maxwell and slowing-down, are considered. The influence of EP parameters, including density, temperature and density gradient, on the frequency and the growth rate of TAEs are obtained and benchmarked with theory and gyrokinetic simulations for the Maxwell distribution with good agreement. When the density and temperature of EPs are above certain thresholds, the transition from TAE to energetic particle modes (EPM) occurs and the mode structure also changes. Comparisons between Maxwell and slowing-down distributions in terms of EP-driven TAEs and EPMs will also be presented and discussed.

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