MF-O31

Kinetically Excited Alfven Eigenmodes in Tokamaks
--- Preliminary Efforts on the DAEPS Project

Shuanghui Hu[1,2], Yueyan Li[3], Xiaorong Wang[4], Liu Chen[3] and The DAEPS team

[1]Southwest Institute of Physics, China

[2]College of Physics, Guizhou University, China

[3]Institute for Fusion Theory and Simulation, Zhejiang University, China

[4]Institute of Mathematics, Chinese Academy of Sciences

Alfven wave and energetic particle physics play important roles in burning plasmas. Experimental studies as well as theoretical/numerical explorations have been revealing the potential excitation mechanism of observed Alfven activities by different species of particles with varied ranges of energy. To better bridge the experimental observations and the theoretical/physical understandings, a long-term DAEPS (Drift Alfven Energetic Particle Stability) project has been launched to develop an eigen-value code for Alfven waves interacting with thermal/energetic particles upon gyrokinetic framework, which can appropriately represent the associated kinetic compressions, including wave-particle resonances upon the toroidal precessional frequency, the bounce frequency, and the transit frequency of ions/electrons of core and energetic components of plasmas. Referred to the initial value algorithm, the eigen-value scheme is a powerful candidate to delineate the stability characteristics of Alfven waves, including the most unstable modes and others. As the DAEPS phase-I task, a local version (modes localized about a magnetic surface) is designed to demonstrate Alfven stabilities, in collaboration with experimental investigations, upon two typical resonances of waves with trapped and passing particles. A case study of BAE (beta-induced Alfven eigenmode) will be presented to detail the relevant aspects of the code.