Non-hybrid computation of kinetic effects on linear MHD instabilities with AEGIS-K code

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We describe the development of the AEGIS-K code to compute kinetic effects on linear global magnetohydrodynamics (MHD) modes in tokamaks in a non-hybrid manner. First, we discuss how we theoretically extended the conventional gyrokinetic theory so that the MHD limit in both perpendicular and parallel directions can be recovered. Second, we present our numerical scheme for implementing this new gyrokinetic theory to study MHD modes in tokamaks. We explain the structure of our AEGIS-K code (Adaptive EiGenfunction Independent Solution - Kinetic shooting code). In the fluid perspective, we give details about our adaptive shooting method and our multiple region matching technique to compute the shear Alfven resonance. In the kinetic perspective, we explain how we take into consideration the particle-wave resonance, trapped particles, and parallel electric field effects. We will also present results from the application of our AEGIS-K code to study the low rotation stabilization of resistive wall modes in an ITER advanced-tokamak scenario.