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Simulating Gyrokinetic/fluid hybrid electromagnetic modes in the total-f gyrokinetic code XGC1[1] JIANYING LANG, ROBERT HAGER, SEUNG-HOE KU, CHOONG-SEOCK CHANG, Princeton Plasma Physics Laboratory — XGC1 code has been extended to include the electronmagnetic capability using the hybrid model with gyrokinetic ions and fluid electrons. This feature will enable a more complete description of the MHD/fluid type mode activities including ELMs and low-n tearing modes. Their interaction with the kinetic neoclassical and microturbulence dynamics needs to be simulated together. Evolution of the background profile should also be captured self-consistently. We report recent development and verification of this hybrid model in the limit of small delta-B. The code has been verified for Alfven waves and ITG/KBM transition, and low-n resistive tearing modes. The KBM capability of XGC1 has been verified against the published results from Gyro, GEM, GS2, Gene, and GTC. Detailed verification of resistive tearing modes and kink modes in the toroidal geometry will be also presented. An implicit method is implemented in XGC1 to bypass the Courant condition caused by fast Alfven oscillations.

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