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Gyrokinetic Simulations of Pellet Perturbed Plasma Relaxation in Tokamak Geometry SATOSHI TOGO, ALBERTO LOARTE, MASANARI HOSOKAWA, SIMON PINCHES, ITER Organization, Route de Vinon-sur-Verdon - CS 90 046 - 13067 St Paul Lez Durance Cedex - France, ROBERT HAGER, C.S. CHANG, Princeton Plasma Physics Laboratory — Pellet injection is one of the methods for controlling edge localized modes (ELMs) that has been adopted for ITER. There remain some uncertainties over how the localized pellet density is distributed through the ablation process, how it interacts with the plasma modes and instabilities, and how it relaxes, which are important factors in optimizing the characteristics of the pellet injection such as the pellet size, injection geometry and velocity. One of the immediate plasma modes and instabilities that could be excited by the pellet-produced (PP) plasma perturbation is the geodesic acoustic mode (GAM) oscillations, which could play a dominant role in the redistribution of the PP plasma poloidally, toroidally and radially. The plasma redistribution across the steep plasma gradient (SPG) needs to be studied kinetically. Ions with nonlocal orbit excursion across SPG may relax and interact with GAMs differently from electrons, and affect the edge radial electric field structure. The PP GAMs could also be responsible for instigating the small-scale ELMs desired in the ITER H-mode operation and observed in the existing tokamak experiments. As the first step in the kinetic study of these processes, the total-f gyrokinetic code XGC will be utilized. A simple pellet ablation model based upon the neutral gas shielding model is implemented in XGC allowing self-consistent simulations of the interaction of pellets with a background plasma.

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