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Reconnecting Modes in Weakly Collisional Plasmas* P. BURATTI, ENEA, B. COPPI, MIT — Drift-tearing modes in ohmically heated toroidal plasmas are observed usually to propagate in the direction opposite to the equilibrium plasma current (the electron direction), with an associated rotation frequency of the order of the electron diamagnetic frequency. On the other hand, after subtraction of the Doppler shift associated with the radial equilibrium electric field, magnetic islands that rotate in the ion direction have been found in neutral-beam-heated plasmas. The same kind of Doppler-shift analysis should be applied to plasmas without beam heating, in order to account for their spontaneous rotation, but this effect, which could revert the sign of mode rotation in the $E_r = 0$frame, has been ignored so far. Two different types of reconnecting modes were considered to explain the experimental results on reconnection in high-temperature plasmas, one related to the drift-tearing mode that propagates in the electron diamagnetic velocity direction and another that propagates in the ion direction. In the first case, a substantial reduction of the ratio between parallel and perpendicular thermal conductivities associated with a pre-excited mode (e.g. due to the electron temperature gradient) is required. In the second case a pre-excited mode driven by the combined effects of the plasma pressure gradient and the magnetic field curvature and the presence of a high-energy particle population are also required. *Sponsored in part by the U.S. DOE.

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