Kinetic Theory of Interaction of High Frequency Waves with a Rotating Plasma

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Abstract

The equations of motion of charged particles of a strongly magnetized flowing plasma under the influence of high frequency waves are derived in the guiding center approximation. A quasilinear theory of the interactions of waves with rotating plasmas is formulated. This is applied to investigate the effect of radio frequency waves on a rotating tokamak plasma with a heated minority species. The angular momentum drive is mainly due to the RF-induced radial minority current. The return current by the bulk plasma gives an equal and opposite rotation drive on the bulk. Using moment equations and a small banana width approximation, the $J \times B$ drive was evaluated for the bulk plasma. Quite remarkably, although collisions are included, the net rotation drive is due to a term which can be obtained by neglecting collisions.

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