Effect of rotation on H-mode transport in DIII–D via changes in the $E \times B$ velocity shear

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Abstract

The effect of rotation on the heat and particle transport is measured in the DIII–D tokamak [Fusion Technol. **8**, 441 (1985)] for H-mode plasmas with edge localized modes (ELMs). In a novel experiment, transport is compared for nearly identical scans of the relative gyroradius in co- and counter-rotating plasmas. Since the plasma profiles are the same, the difference in the transport scaling can be attributed to changes in the sheared $E \times B$ flow caused by the reversal of the toroidal plasma velocity. The ion heat and particle transport are found to be sensitive to the change in the rotation direction whereas the electron heat transport is not. Simulations using a gyroLandau-fluid drift wave transport model show that the variation in the ion heat transport for co/counter rotation is due to changes in the $E \times B$ shear stabilization, but the electrons appear to be governed by a different transport mechanism.

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