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Control of drift wave turbulence by driven plasma currents OLAF GRULKE, CHRISTIAN BRANDT, STEFAN ULLRICH, KIAN RAHBARNIA, THOMAS KLINGER, MPI for Plasma Physics, EURATOM Association, D-17491 Greifswald — The anomalous transport in the plasma edge of fusion devices is believed to be dominated by the drift wave instability, which is inevitable because of the relatively steep radial plasma pressure gradient. Due to its three-dimensional nature the associated parallel plasma currents are a characteristic feature of the drift wave instability. In the present paper we demonstrate that drift waves nonlinearly interact with driven plasma currents in the linear, homogeneously magnetized helicon plasma device VINETA. The intrinsic parallel drift wave currents have an amplitude of typically $100\,mA/cm^2$. If currents are driven mode-selectively by an array of eight electrodes or eight saddle coils on a plasma circumference, respectively, single drift wave modes can be synchronized in frequency, whereas the frequency range of synchronization depends nonlinearly on the amplitude of the driven current. The synchronization is of spatiotemporal nature, i.e. is only achieved if also the propagation direction of the driven current pattern is parallel to the drift wave's phase velocity. In drift wave turbulence the energy of the turbulent fluctuations can be synchronized to a single predefined drift wave mode, which results in an almost complete suppression of the associated fluctuation-induced transport.

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