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Turbulent energy transfer in electromagnetic turbulence: hints from a Reversed Field Pinch plasma N. VIANELLO, V. ANTONI, E. SPADA, M. SPOLAORE, R. CAVAZZANA, G. SERIANNI, Consorzio RFX, Euratom-ENEA Association, Padova, Italy, H. BERGSAKER, M. CECCONELLO, J. DRAKE, Alfven Laboratory, KTH, Stockholm, Sweden — The relationship between electromagnetic turbulence and sheared plasma flow in a Reversed Field Pinch is addressed. $\mathbf{E} \times \mathbf{B}$ sheared flows and turbulence at the edge tends to organize themeselves near marginal stability, suggesting an underlying energy exchange process between turbulence and mean flow. In MHD this process is well described through the quantity P which represents the energy transfer (per mass and time unit) from turbulence to mean fields. In the edge region of RFP configuration, where magnetic field is mainly poloidal and the mean $\mathbf{E} \times \mathbf{B}$ is consequently toroidal, the quantity P results:

$$P = \left[-\frac{\langle \tilde{b}_r \tilde{b}_\phi \rangle}{\overline{\rho}\mu_0} + \langle \tilde{v}_r \tilde{v}_\phi \rangle \right] \frac{\partial \overline{V}_\phi}{\partial r}$$

where $\overline{V}_\phi$ is the mean $\mathbf{E} \times \mathbf{B}$ toroidal flow, $\overline{\rho}$ the mean mass density and $\tilde{b}$ and $\tilde{v}$ the fluctuations of velocity and magnetic field respectively. Both the radial profiles and the temporal evolution of P have been measured in the edge region of Extrap-T2R Reversed Field Pinch experiment. The results support the existence of oscillating energy exchange process between fluctuations and mean flow.

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