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The effect of poloidal asymmetries on turbulent impurity transport ISTVAN PUSZTAI, Applied Phys., Chalmers Univ. of Technology, and Euratom-VR Association; Plasma Sci. and Fusion Center, Massachusetts Institute of Technology, TUNDE FULOP, ALBERT MOLLEN, Applied Physics, Chalmers University of Technology, and Euratom-VR Association — We show that a poloidally varying electrostatic potential can lead to a strong reduction or sign change of the impurity peaking factor. The poloidal variation of the potential has a twofold effect. First, magnified by the charge of the impurities, it can lead to significant in-out impurity asymmetry which, provided being sufficiently strong, can lead to a sign change in the impurity peaking factor in itself. Second, the sign change of the impurity peaking factor can happen at realistically low impurity asymmetry strength, aided by the $\mathbf{E} \times \mathbf{B}$ drift of impurities in the poloidally varying equilibrium potential. The peaking factor of highly charged impurities depends mainly on magnetic shear, the forms of the ballooning eigenfunction, and the equilibrium potential. We present an approximate expression for the impurity peaking factor retaining finite $\mathbf{E} \times \mathbf{B}$ and parallel compressibility effects. Using the properties of the full linearized collision operator for impurity self collisions we demonstrate that collisions – as well as finite Larmor radius effects – have no impact on the impurity peaking to leading order in $1/Z$, where Z is the impurity charge number.

Istvan Pusztai
Massachusetts Inst of Tech

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