Impurity transport in Alcator C-Mod in the presence of poloidal density variation induced by ion cyclotron resonance heating

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Control of high-Z impurity species is important for magnetic confinement fusion devices, since impurities cause radiation losses and plasma dilution. It has been experimentally observed that one way to affect the impurity transport is through the application of radiofrequency heating. In the present work we study molybdenum transport in an ion cyclotron resonance heated Alcator C-Mod discharge \cite{1}, using local gyrokinetic simulations and theoretical modeling \cite{2,3} including the effect of poloidal asymmetries and plasma elongation. Although a strong minority temperature anisotropy is present in the deep core, the poloidal asymmetries are found to have negligible impact on the turbulent molybdenum transport in this region. This is in agreement with the experimental observations. In the outer core, where the magnetic shear is larger, poloidal asymmetries may lead to a reduction of the molybdenum peaking, according to the theoretical model. However, uncertainties in atomic physics processes prevent quantitative comparison with experiments in this region.

References

\cite{1} M. L. Reinke, N. T. Howard, I. H. Hutchinson, M. Chilenski, M. Greenwald, A. Hubbard, J. W. Hughes, J. E. Rice, J. R. Walk, A. E. White, 55th Annual Meeting of the APS Division of Plasma Physics, Denver CO, USA, TP8.00037.
