Effect of intermittent transport on rf-specific impurities*

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Experiments and computer simulations show that the turbulent transport across the SOL is mediated by coherent objects called "blobs," which are localized enhancements of plasma in the 2D (radial, poloidal) plane (e.g. see the review paper in Ref. 1). Thus, the SOL density and temperature are spatially and temporally intermittent. The effect of this intermittency on nonlinear (e.g. typical atomic physics) processes is not yet understood. For a nonlinear function f, intermittency ensures that $< f(Q) > \neq f(< Q >)$, where Q is any quantity and <> denotes a time average, so that a usual transport code treatment may underestimate the effect.[1] The present work addresses the effect of intermittency in the context of an important practical application: *impurity sputtering (and self-sputtering) by ions accelerated in rf sheath potentials* on surfaces near ICRF antennas.[2] Rf-enhanced electron losses during ICRF heating can lead to kV sheath potentials in the vicinity of the antennas; the ion acceleration in these potentials gives large sputtering yields and the possibility of self-sputtering for high-Z materials.[2] For ITER, if the ICRF antennas are recessed in the wall, this leads to the possibility of self-sputtering avalanche at the first wall, which would clearly impact the desirability of using a high-Z coating. From a theoretical point of view, this problem is also an interesting example of an rf-turbulence interaction in which intermittency plays an important role. We will describe a simple ballistic model for the mutual interaction of a periodic train of blobs with the neutral pulses created by blob-induced sputtering of a high-Z wall. A condition for self-sputtering avalanche will be given under certain simplifying assumptions, and its dependence on blob, sheath, and wall parameters will be described.

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[1] S. I. Krasheninnikov, D. A. D'Ippolito and J. R. Myra, to be published in J. Plasma Phys. **74**, 1 (2008).
[2] D. A. D'Ippolito, J. R. Myra, M. Bures and J. Jacquinot, Plasma Phys. and Control. Fusion **33**, 607 (1991).