

Fractional diffusion and the modelling of avalanche transport in magnetically confined plasmas

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It has been known for at least two decades that, in certain regimes, magnetically confined plasmas such as those within a tokamak or stellarator, may exhibit non-diffusive radial transport that is badly modelled by means of traditional, effective, eddy diffusivities or conductivities. These regimes may become very important in next-step experiments, such as the ITER tokamak currently under construction in Southern France. In this talk, we will discuss the use of fractional transport theory to provide a more suitable model to capture the non-diffusive features of transport in these situations, both from a fundamental and practical perspective. Comparisons with numerical simulations and, when available, experiments, will be also discussed.