Abstract Submitted
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Nonlocal transport in the presence of transport barriers[1] D. DEL-CASTILLO-NEGRETE, Oak Ridge National Laboratory, USA — There is experimental, numerical, and theoretical evidence that transport in plasmas can, under certain circumstances, depart from the standard local, diffusive description. Examples include fast pulse propagation phenomena in perturbative experiments, non-diffusive scaling in L-mode plasmas, and non-Gaussian statistics of fluctuations. From the theoretical perspective, non-diffusive transport descriptions follow from the relaxation of the restrictive assumptions (locality, scale separation, and Gaussian/Markovian statistics) at the foundation of diffusive models. We discuss an alternative class of models able to capture some of the observed non-diffusive transport phenomenology. The models are based on a class of nonlocal, integro-differential operators that provide a unifying framework to describe non- Fickian scale-free transport, and non-Markovian (memory) effects. We study the interplay between nonlocality and internal transport barriers (ITBs) in perturbative transport including cold edge pulses and power modulation. Of particular interest in the nonlocal "tunnelling" of perturbations through ITBs. Also, flux-gradient diagrams are discussed as diagnostics to detect nonlocal transport processes in numerical simulations and experiments.

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