Abstract Submitted
for the DPP07 Meeting of
The American Physical Society

Application of fractional diffusion to model perturbative transport experiments in JET DIEGO DEL-CASTILLO-NEGRETE, Oak Ridge National Laboratory, PAOLA MANTICA, Istituto di Fisica del Plasma, Associazione Euratom-ENEA-CNR, Italy, VOLKER NAULIN, J. RASSMUSSEN, Association EURATOM - Risoe National Laboratory Technical University of Denmark, JET EFDA CONTRIBUTORS TEAM — Perturbative transport experiments follow the transient response of the plasma to externally applied small perturbations, e.g. plasma edge cooling and heating power modulation. These experiments provide time dependent information that can be used for testing models. JET experiments show an asymmetry between the relatively slow propagation of ICRH power modulation perturbations and the fast propagation of edge cold pulses [1]. Previous attempts to model these experiments have not been successful. In particular, while local models are able to reproduce the modulation data, they underestimate the speed of the pulses. Here we show that a non-local transport model based on the use of fractional diffusion operators [2] is able to describe the JET experiments. The model reproduces the amplitude and phase profiles of the modulation data and, most importantly, it gives pulse propagation speeds consistent with the experiment.
[1] P.Mantica et al.,Proc.19th Intern. Conf. on Fusion Energy, Lyon [IAEA,Vienna,2002] EX/P1-04.
[2] D. del-Castillo-Negrete, Phys. Plasmas 13, 082308 (2006).

Diego del-Castillo-Negrete
Oak Ridge National Laboratory

Date submitted: 28 Aug 2007 Electronic form version 1.4