Abstract Submitted
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Can the Non-linear Ballooning Model describe ELMs?[1] S.A. HENNEBERG, York Plasma Institute, University of York, S.C. COWLEY, CCFE, Culham Science Centre and Department of Physics, Imperial College, H.R. WILSON, York Plasma Institute, University of York — The explosive, filamentary plasma eruptions described by the non-linear ideal MHD ballooning model is tested quantitatively against experimental observations of ELMs in MAST. The equations describing this model were derived by Wilson and Cowley [1] for tokamak-like geometry which includes two differential equations: the linear ballooning equation which describes the spatial distribution along the field lines and the non-linear ballooning mode envelope equation, which is a two-dimensional, non-linear differential equation which can involve fractional temporal-derivatives, but is often second-order in time and space. To employ the second differential equation for a specific geometry one has to evaluate the coefficients of the equation which is non-trivial as it involves field line averaging of slowly converging functions. We have solved this system for MAST, superimposing the solutions of both differential equations and mapping them onto a MAST plasma. Comparisons with the evolution of ELM filaments in MAST will be reported in order to test the model.

[1] H.R. Wilson and S.C. Cowley, Phys. Rev. Lett., 92, 175006 (2004)

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