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Numerical simulations of turbulent cascade in solar-flare magnetic reconnection

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The general concept of turbulent magnetic reconnection becomes now very attractive in the solar flare research as it can address many open issues in that field. Nevertheless, it has not been explored yet by numerical simulation since it requires a model which spans over a broad scale-range of mutually coupled phenomena. Traditional simulation approaches are not capable to cover a range of scales from the global system dimensions down to the dissipation scale because of limited number of grid points.

A solution could be the development of appropriate recursive numerical algorithm which at different levels of recursion solves the processes in current sheet fragmentation on different spatial and temporal scales. For this sake we suggest a numerical scheme, where the data representing the system under study are stored in a dynamic hierarchically organised data structure (a tree) which should reflect the self-similar properties of the anticipated solution. To some extent such algorithm can be considered as an alternative approach to Adaptive Mesh Refinement (AMR) codes.