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Application of Smoothed Particle MHD (SPMHD) techniques to the simulation of magnetically confined plasma dynamics LUIS VELA-VELA, RAUL SANCHEZ, J. MIGUEL REYNOLDS-BARREDO, U. Carlos III de Madrid — Magnetically confined plasmas relevant for fusion scenarios are, to first approximation, well described by ideal and resistive MHD. This includes the description of their equilibrium and stability properties, as well as their medium-to-long term nonlinear evolution under external forcing. In many of these cases, one needs to deal with magnetic topologies that include magnetic islands, stochastic regions or that require the consideration of free-moving boundaries. The present work is part of an on-going effort to develop of a numerical code capable of dealing with these situations by taking advantage of the SPMHD formalism that, although widely used in astrophysical plasmas, is not widespread within the fusion community. SPMHD is a particle (i.e., Lagrangian) method particularly well-suited to deal with complicated boundaries while retaining great parallelization benefits. Here, we will report on the adaptation of the SPMHD equations to the case of magnetically confined plasmas, several benchmarking tests typical for MHD codes, and some preliminary results obtained for more elaborate scenarios. Our results suggest that our new code (EVA) can be very advantageous to deal with problems of current interest for the fusion community, including tokamaks and stellarators.

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