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Nonlinear 3D visco-resistive MHD modeling of fusion plasmas: a comparison between numerical codes D. BONFIGLIO, Consorzio RFX, Euratom-Enea Association, Padova, Italy, L. CHACON, ORNL, S. CAPPELLO, Consorzio RFX, Euratom-Enea Association, Padova, Italy — Fluid plasma models (and, in particular, the MHD model) are extensively used in the theoretical description of laboratory and astrophysical plasmas. We present here a successful benchmark between two nonlinear, three-dimensional, compressible visco-resistive MHD codes. One is the fully implicit, finite volume code PIXIE3D [1,2], which is characterized by many attractive features, notably the generalized curvilinear formulation (which makes the code applicable to different geometries) and the possibility to include in the computation the energy transport equation and the extended MHD version of Ohm's law. In addition, the parallel version of the code features excellent scalability properties. Results from this code, obtained in cylindrical geometry, are compared with those produced by the semi-implicit cylindrical code SpeCyl, which uses finite differences radially, and spectral formulation in the other coordinates [3]. Both single and multi-mode simulations are benchmarked, regarding both reversed field pinch (RFP) and ohmic tokamak magnetic configurations. [1] L. Chacon, Computer Physics Communications **163**, 143 (2004). [2] L. Chacon, Phys. Plasmas **15**, 056103 (2008). [3] S. Cappello, Plasma Phys. Control. Fusion **46**, B313 (2004) & references therein.

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