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Towards a novel multifluid coronal model

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We present preliminary results obtained from our multifluid MHD global coronal model that is intended to provide realistic data-driven inlet boundary conditions for the European heliospheric forecasting information asset (EUHFORIA). The coronal model is based on a novel 3-D multifluid module (used in single-fluid MHD mode for the time being) within the COOLFluiD framework that solves the MHD equations on unstructured grids with an implicit solver employing finite volume methods. The initial magnetic field up to $2.5\ R_{\odot}$ is obtained by a PFSS extrapolation of GONG magnetograms using a Poisson solver. The field is then extrapolated onto a larger mesh beyond the source surface to 0.1 AU (coinciding with the inlet boundary of the EUHFORIA model) by assuming only radial field components and ensuring magnetic flux conservation. The flow field is initialized with a spherically symmetric solution of Parker's hydrodynamic model, while initial temperature and density are chosen such that a balance of pressure and gravity is ensured. Our implicit coronal model will excel in terms of significantly reduced CPU time and replace the current empirical Wang-Sheeley-Arge (WSA) model employed by EUHFORIA first in a steady and finally in a time dependent manner.