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2D Lagrangian Code for Resistive Evolution of Plasma Equilibrium and Its Application to MTF Studies at General Fusion IVAN KHALZOV, RYAN ZINDLER, MICHEL LABERGE, General Fusion Inc. — 2D Lagrangian code is developed in General Fusion (GF) for simulations of resistive plasma dynamics in magnetized target fusion (MTF) systems. The goal of these simulations is to model GF plasma experiments and to guide the design of MTF reactor, in which liquid metal liner compresses compact toroid plasma. We adopt the method of Grad and Hogan [PRL 24 (1970) 1337], who showed that at the resistive timescale the tokamak-like plasma goes through a sequence of equilibria, which are linked together through the resisitive diffusion of the poloidal and toroidal magnetic fluxes and the transport phenomena in the plasma. At every time step the code alternates between solving the 2D Grad-Shafranov equilibrium equation and the 1D flux-averaged transport equations. The main advantage of this code is its speed: the time step is limited by a large resistive diffusion timescale and not by a small Alfven timescale as in usual MHD codes. The code is Lagrangian in the sense that the numerical mesh follows the flux surfaces. Lagrangian nature of the code allows for its coupling with moving boundaries of plasma domain, which is especially useful in modeling MTF reactor. Comparison of simulations with ongoing GF experiments and results of MTF reactor design optimization will be presented.

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