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Progress towards a new 3D equilibrium reconstruction code[1]
GREGORIO L. TREVISAN, LANG L. LAO, General Atomics — Equilibrium reconstruction is a crucial modeling step for any fusion experiment. In recent years, considerable development efforts have focused on obtaining solutions to the general 3D equilibrium reconstruction problem. While other notable 3D codes typically rely on Fourier decompositions and iterative procedures, the 3D equilibrium code presented in this contribution retains a full geometrical approach and, instead, tackles the equilibrium problem similarly to EFIT, that is, by decoupling the algorithm in a slower precomputation of response function tables, to be run once and stored, and a faster multiplication algorithm to be invoked multiple times. The resulting 3D code, which is under heavy development, is capable of computing the magnetic field and the vector potential at any point in space as produced by a given set of external magnetic coils and a predetermined set of plasma filaments, and therefore predicts the modeled diagnostic signals on any set of magnetic flux loops or probes. The response function matrix is then inverted to obtain the filament positions and currents that best fit the experimentally-obtained magnetic data. The main features of the code are presented here, together with the shortcomings of the filamentary model, and early results and benchmarks.

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