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A novel code for the simulation of plasma equilibrium and evolution

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The simulation of the plasma equilibrium and its evolution is important for the study of plasma physics and for the correct design of fusion devices. For this purpose, a novel code, based on the solution of the Grad-Shafranov equation, has been fully implemented in ANSYS. It exploits the finite element method using the magnetic potential vector formulation. In this approach plasma pressure and current density profiles are described by means of two main parameters: the internal plasma inductance li and the Poloidal Betap. Several ITER equilibria of limiter and diverted plasma configurations have been reproduced and benchmarked with validated codes such as MAXFEA and DINA. Being fully implemented in ANSYS this code will allow the coupling of the 2D axisymmetric plasma equilibrium equations, describing the plasma behavior, with the full 3D eddy currents equations, describing the surrounding three-dimensional structures.

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