On a mathematical model arising in the nuclear fusion by magnetic confinement in Stellarator devices: existence of solutions and numerical aproach

Juan Francisco Padial
Universidad Politécnica de Madrid

We present a short survey on some mathematical results and some numerical experiments on a non-local two dimensional free boundary problem modeling the magnetic confinement of a plasma in a Stellarator device. One of the main difficulties of the magnetically controlled plasma fusion (in axisymmetric geometric devices as Tokamaks or non axisymmetric geometric ones as Stellarators), is to determinate the conditions on the magnetic field and on the current density in order to maintain the plasma far from the camera walls. We will prove the existence of a solution (Díaz, Padial, Rakotoson 1998) by means of a Galerkin argument for a new family of elliptic problems associated to an equivalent *direct* (but *non-local*) formulation of problem and by finite elements we show some numerical results (Díaz, Galán, Padial 2012).

References

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