

NUMERICAL ANALYSIS AND SCIENTIFIC COMPUTING
SEMINAR

*Computational models and challenges in tokamak fusion
reactors*

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Abstract: The aim of this presentation is twofold. Firstly the key concepts about magnetic fusion with tokamaks are introduced by focusing the attention on the key dimensioning parameters as well as on the basic operational principles of a tokamak reactor. In the second part of the talk the main models used in tokamak plasmas simulation and in the most challenging engineering problems are presented. With respect to tokamak plasmas the MHD approximations and models are introduced (e.g. single fluid MHD, ideal MHD, etc.). The attention is then focused to the key problem of magnetic equilibrium and stability computation. As far as the engineering applications are concerned, three areas of interested are discussed, namely (1) the computation of transient electromagnetics in the metallic structures surrounding the plasma, (2) the stability problem of low-temperature superconductors and (3) the main features in 14 MeV neutron shielding.

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