# Comprehensive suite of codes for plasma-edge modelling

R. Schneider, X. Bonnin, N. McTaggart, A. Runov, M. Borchardt,
J. Riemann, A. Mutzke, K. Matyash, H. Leyh, M. Warrier,
D. Coster[1], W. Eckstein[1],R. Dohmen [1]

Max-Planck-Institut für Plasmaphysik, EURATOM Association,
D-17491 Greifswald, Germany,
(1) Max-Planck-Institut für Plasmaphysik, EURATOM Association,
D-85748 Garching, Germany

The various aspects of plasma-edge physics are included in a comprehensive suite of codes having applications from industrial plasmas to fusion devices.

Here the basic ideas, status, and relationship of the codes are summarized: plasma-wall interaction effects on a microscopic length-scale (e.g. chemical sputtering effects) are studied with molecular dynamics.

Mesoscale effects (e.g. sputtering and diffusion in amorphous materials) are analysed with Monte Carlo methods (kinetic Monte Carlo with input from molecular dynamics or experiment or binary collision approximation).

A full kinetic description (including ions, electrons, neutrals and their collisions) is possible for some low-temperature plasmas (ECR methane plasmas) and for qualitative studies of edge plasma effects in fusion edge plasmas.

Fluid transport codes for the edge of magnetically confined plasmas (2D tokamaks, 2D tokamaks with ergodic perturbations, 3D stellarators) are necessary for understanding better the complex physics in such devices. Here, finite volume, finite difference and Monte Carlo methods are used and benchmarked against each other and experiments.