Plasma Wall Interaction in magnetically confined fusion: status and needs

V.Philipps
Institute of Energy Research, Plasma Physics, Forschungszentrum Jülich, Association EURATOM-FZJ, 52425 Jülich, Germany

Fusion research has come into a new stage with the decision to build the International Thermonuclear Experimental Reactor (ITER). The confidence that ITER will achieve a burning plasma allowing detailed studies of a self-heated fusion plasma and demonstrating the feasibility of generating a surplus of energy is based on a good database from present devices. However this database originates from short pulse devices with mostly carbon wall cladding which have not demonstrated enough the compatibility of the plasma scenarios with the specific wall requirements in ITER.

These questions are largely related with long pulse steady state operation and the power loads during steady state operation and transient events. These questions control also the material erosion and migration and thus the lifetime of the wall components and the associated long-term tritium retention, which should stay below the safety limit. The physics controlling these processes is strongly coupled with the choice of the first wall materials, which has been selected for ITER to be Beryllium for the main chamber first wall, Tungsten and CFC graphite in the divertor region.

This contribution describes the critical problems and the ongoing and necessary research in this area for ITER and a fusion power plant beyond ITER.