FUSION D+T AND D+D PRODUCTS DYNAMICS FOR THE DIFFERENT FUELING SCENARIOS IN TOROIDAL MAGNETIC REACTORS

A.V. Eremin[1], *A.A. Shishkin*[1,2]

[1]V.N. Karazin Kharkiv National University
(*4, Svobody Sq., Kharkiv 61077, Ukraine;*
e-mail: alex.eremin@gmail.com),
[2]Institute of Plasma Physics, National Scientific Center
"Kharkiv Institute of Physics and Technology"
(*1, Akademichna Str., Kharkiv 61108, Ukraine*)

S u m m a r y

Achieving the fusion power in Joint European Torus (JET) tokamak in the operation with the deuterium and tritium mixture plasma and the possible next step in the controlled fusion device International Tokamak Experimental Reactor (ITER) stimulate the further study of the fusion plasma in a toroidal magnetic trap of the reactor grade. Among many problems, there is a problem on the effect of heating injection and the different fueling scenarios on the power and particle balances of fusion plasma [1–4]. Minimization of power injection is considered in a lot of works (for example, see [1]). In this work, we would like to accent how the different fueling scenarios can lead to more optimal operation scenarios of the fusion reactor, including ITER. In our study, we use the system of balance equations [2, 3] which is modified here with the time variation of particle fueling scenarios including not only fluctuations. We apply this system for the analysis of the D+T fusion products evolution in time in the tokamak reactor ITER and the D+D fusion products evolution in time in the torsatron/heliotron Large Helical Device [4–8]. There exist the analyses of plasma parameters in a fusion reactor for a steady state (see, e.g, [9]) and the temporal evolution of plasma parameters on the way (access) to ignition [10]. In this work, we develop this approach further.