ENERGY CONFINEMENT IN W 7-AS AND EXTRAPOLATION TO A HELIAS REACTOR

H. Wobig [1], SSS-Group [*]

[1] *Max-Planck Institut für Plasmaphysik, EURATOM Association, Garching bei München, Germany*

The energy confinement time in Wendelstein 7-AS shows a strong dependence on the rotational transform, which makes it difficult to establish a universal scaling laws for energy confinement. Under optimum conditions the scaling of confinement follows Lackner-Gottardi scaling with an improvement factor of 1.2. This holds in the very neighbourhood of low order rational surfaces ($\iota = 0.34$ and $\iota = 0.52$). The scaling law together with other ones published in the literature are applied to the Helias reactor HSR4/18 ($R = 18$ m, $a = 2$ m, $B = 5$ T) showing that the conditions of self-sustained burn can be satisfied. In a second part the one-dimensional heat conduction equation is solved for the temperature profile taking into account alpha-particle heating and bremsstrahlung losses. The non-linearity of the equation leads to multiple solutions, the scaling of the stable solution is studied in detail.