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Examination of radiating mantles for ITER and fusion reactors
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M. PEKKER, IFS, Univ. of Texas at Austin — Simple calculations show that pure coronal radiation inside the separatrix is not an adequate solution for the critical heat exhaust problem of burning plasmas. However the idea of using a radiating mantle to solve the problem gets a boost from current experiments which show that the radiating capacity of a mantle is vastly increased by mechanisms which may be collectively called non-coronal. We have investigated if these enhancing mechanisms scale to two cases of future interest: ITER (steady state ITB scenarios where the ITER divertor appears inadequate) and the higher power fusion reactor. Semi-analytic arguments and preliminary calculations show that even the inclusion of non-coronal effects due to neutral D,T atoms as well as impurity diffusion does not allow a working radiating mantle that will solve the reactor heat exhaust problem. Scaling from the current experiments to future experiments fails, primarily because of the much longer confinement times and higher temperatures in ITER and reactor.

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