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MODELING THE LITHIUM LOOP IN A LIQUID METAL DIVERTOR FOR FUTURE FUSION REACTORS

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Solutions for the steady-state power exhaust problem in future fusion reactors (e.g, DEMO) are not automatically provided by present experiments or even ITER, because the expected heat fluxes, as well as the level of neutron irradiation, will be much higher. Dedicated work packages are being devoted to this problem within EUROfusion and even a dedicated facility (the Divertor Tokamak Test –DTT) is being proposed by Italy. Among the possible innovative solutions, a liquid metal (LM) divertor has been proposed more than 20 years ago. The particularly attractive feature of this solution is obviously the absence of damage to the wall, even in the case of large heat fluxes, thanks to the high latent heat of evaporation and to the liquid nature of the wall, which can be constantly replenished.
The present work aims at developing a first model of the LM loop which will be the core of the tools to be developed and eventually applied, in a later phase of the project, to the conceptual design of an LM divertor for the DTT facility.
The model will describe the transport of the LM in the evaporation chamber, including its interaction with the plasma.

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