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2-D thermal response calculations of the liquid lithium divertor on NSTX K. GAN, ASIPP, A.G. MCLEAN, J-W. AHN, T.K. GRAY, R. MAINGI, ORNL — The liquid lithium divertor (LLD) in NSTX was installed for particle and impurity control in NSTX, and its effectiveness was predicted to vary with the lithium surface temperature. It is therefore important to know the temperature evolution of the LLD during plasma discharges. A 2-D implicit finite difference code ("Li_enthalpy") was written to simulate the lithium temperature with an accurate description of the LLD components, which include a surface lithium layer, a porous molybdenum mesh that is $\sim 50\%$ filled with lithium, a thin stainless steel layer, and a thick underlying copper substrate. The heat flux on the graphite was measured with a recently developed dual-band infrared camera; we use the same heat flux profile on the LLD at the same major radius, because of toroidal symmetry. The code "Li_enthalpy" computes the LLD thermal response to this heat flux profile; a Gauss-Seidel iterative procedure was implemented to solve the phase-change problem as lithium melted in response to plasma heating. The computed LLD temperature response is then compared and calibrated with the measured surface temperature on the LLD with the dual-band camera. From this the dynamics of the spatially and time varying liquid lithium layer thickness are extracted. Analysis from a number of plasma discharges is presented. *Supported in part by U.S. DoE contracts DE-AC05-00OR22725 and DE-AC02-09CH11466.

Rajesh Maingi
ORNL

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