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A mechanism for large divertor plasma energy loss via lithium radiation in tokamaks[1] T.D. ROGNLIEN, E.T. MEIER, V.A. SOUKHANOVSKII, LLNL — Lithium has been used as a wall-conditioning element in a number of tokamaks over the years, including TFTR, FTU, and NSTX, where core plasma energy confinement and particle control are often found to improve following such conditioning. Here the possible role of Li in providing substantial energy loss for divertor plasmas via line radiation is reported. A multi-charge-state 2D UEDGE fluid model is used where the hydrogenic and Li ions and neutrals are each evolved as separate species and separate equations are solved for the electron and ion temperatures. It is shown that a sufficient level of Li neutrals evolving from the divertor surface via sputtering or evaporation can induce energy detachment of the divertor plasma, yielding a strongly radiating zone near the divertor where ionization and recombination from/to neutral Li can radiate most of the power flowing into the scrape-off layer while maintaining low core contamination. A local peaking of Li emissivity for electron temperatures near 1 eV appears to play an important role in the detachment of the mixed deuterium/Li plasma. Evidence of such behavior from NSTX discharges will be discussed.

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