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Critical length scales for flow phenomena in liquid metal batteries[1] DOUGLAS KELLEY, University of Rochester, TOM WEIER, Helmholtz-Zentrum Dresden-Rossendorf — Liquid metal batteries, a new technology for grid-scale energy storage, are composed of three liquid layers and therefore subject to a wide variety of fluid dynamical phenomena, both beneficial and detrimental. Some, like thermal convection and electrovortex flow, drive finite flow regardless of the size, current density, and temperature of the battery. Others, like the Tayler instability and the metal pad instability, occur only in certain parameter regimes — almost always dependent on length scale. I will discuss critical length scales, considering implications for battery design in light of fundamental fluid dynamics.

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