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Heat and Ash Removal by Curved Liquid Metal Divertor AHMED HASSANEIN, PAUL FISCHER, ISAK KONKASHBAEV, Argonne National Laboratory — Liquid flow divertors are being considered for use in future fusion reactors to remove most candidate fluids and particles (D, T, He, impurities) exiting the tokamak core plasma via the scrape off layer (SOL). Problems of heat removal can be solved, but particle removal remains a problem. The main difficulty is high diffusion rate in fluids thus recycling rate can be very large. Flow in the curved tray of our interest, regarded as a sector of the Couette flow between two rotational cylinders, has been well studied. Vortexes displaced along the flow direction (rotating cells) are called Gortler vortexes. Such curved trays are being theoretically studied at ANL for heat smoothing and removal in targets of high power ($\approx$1 MW) accelerators (e.g., RIA, linear colliders, and SNS). The effects of heat rates and particle transportation on material properties and divertor design (geometry, flow velocity, and depth) were calculated by numerical simulation using the 3D MHD spectral-element code developed at ANL and the University of Chicago for astrophysical purposes. Recommendations for experimental study of liquid metal divertors are given for different candidate materials having very high electrical conductivity (Li) to very low conductivity (Flibe).

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