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Chocked flows in open capillary channels[1] JOERG KLATTE, U. ROSENDAHL, D. HAAKE, A. GRAH, M. DREYER — Capillary systems provide a passive means to control fluids and are widely used for space craft fuel management. In the present study the forced liquid flow through an open capillary channel under low gravity conditions is investigated. Due to convective and viscous momentum transport the pressure along the flow path decreases and causes the free surface to bend inwards the open channel. Since the curvature of the free surface depends on the channel pressure the flow rate is limited. The maximum flow rate is achieved when the free surface collapses and gas ingestion occurs. This critical flow rate depends on channel geometry and liquid properties. The talk concludes analytical modeling and numerical computations to calculate pressure, free surface curvature and velocity parameters. The results predict the critical flow rate for different geometries and can be used to avoid greater design margins of capillary systems.

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