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HOLE-PATTERNED 2D STRUCTURES FOR ANISOTROPIC THERMAL TRANSPORT

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Abstract. Hole-patterned materials with a thermal anisotropy can be widely used to guide the heat flow for various energy-related applications. Such a thermal anisotropy can be exploited to produce a thermal management of thin-film-based electronic devices. In this work, we study the heat transfer along a two-dimensional thin film patterned material with slots made of anisotropic thermal materials. The film can be subjected to constant external temperature conditions or fluxes. We explore the effect of the geometry and thermal anisotropy of the constitutive material of the holes and the pattern, on the heat fluxes. We study the transient and stationary heat fluxes and temperature profiles obtained from the numerical integration of the 2D heat equation using an own-designed code in Python. These hole-patterned structures can be used for applications such as heat guide, thermal insulation, and thermoelectrics providing more scopes for tailoring the transport properties.