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A Hydrogen Pulsating Heat Pipe

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In order to enhance the application of a cryocooler that provides a given cooling capacity at the cold head location, and effectively spread that cooling over an extended region such as a large-scale superconducting magnet, one requires a highly efficient heat transfer method. The pulsating heat pipe affords a highly effective heat transfer component that has been extensively researched at room temperature, but is recently also being investigated for use in low temperature applications. This paper summarizes previous research on cryogenic pulsating heat pipes and describes the design, including heat leak and structural calculations, of a hydrogen-based pulsating heat pipe. The experiment is designed to characterize the thermal performance of the PHP as a function of the applied heat, number of turns, filling ratio, inclination angle, and length of adiabatic section.

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