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C3Or2B-02: Simulation of a cryogenic capillary tube: thermodynamic behavior subjected to heat load.

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Pulsating Heat Pipes (PHP) are excellent heat transfer devices, constituting the thermal link between a cold sink and an object to cool. The interest for developing cryogenic pulsating heat pipes to cool superconducting magnets is growing because of their lightness and high thermal performance. A numerical model has been developed using the Navier-Stokes solver from ANSYS Fluent software to evaluate the influence of different parameters affecting the thermodynamic behavior of cryogenic working fluids in the pulsating heat pipes. An existing experiment of a single horizontal capillary tube is reproduced in the simulation where the two-phase operating fluid is computed using the VOF method in a 2D axisymmetric mesh. Different parameters are tested to analyze the liquid-vapor interface and the heat transfer between the wall and the two-phase fluid in order to contribute to a better understanding of the working fluid behavior and to the development of future 2D simulations of pulsating heat pipes.

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