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Transport in Passive, High Thermal Conductivity Heat Spreaders

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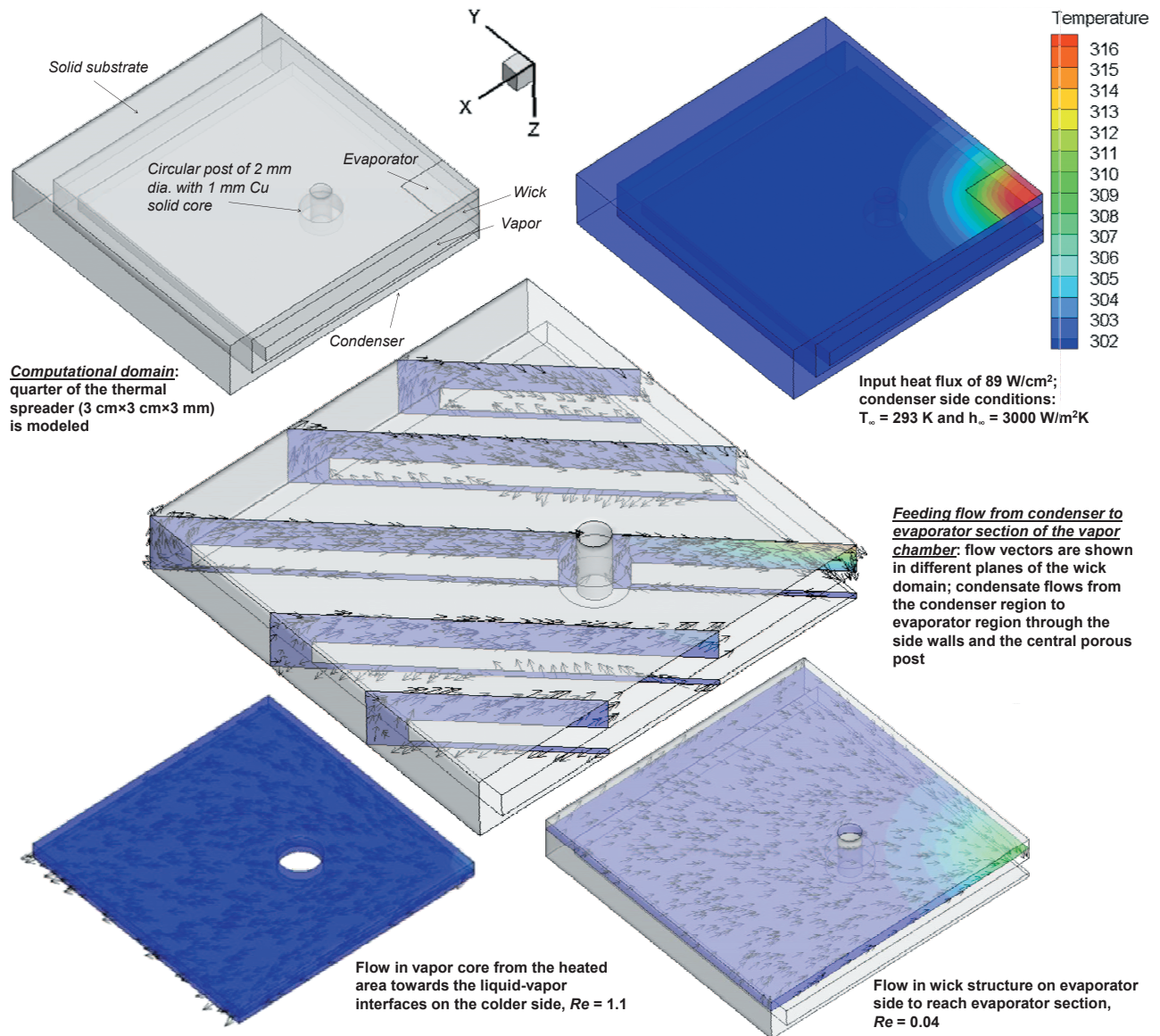
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Transport in Passive, High Thermal Conductivity Heat Spreaders

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A transient, three-dimensional model for thermal transport in heat pipes and vapor chambers is developed. The Navier-Stokes and energy equations are solved numerically. A porous medium formulation is used for the wick region. Phase change at the liquid-vapor interface is modeled using kinetic theory. The performance of a 3 mm thin vapor chamber with four circular porous posts inside the vapor core is predicted. Liquid flows from the condenser to the evaporator through two separate paths, viz., the side walls and the porous posts, which lead to a shorter path for liquid return, and decrease the liquid pressure drop. Optimal placement of the porous posts would help increase the capillary limit of the heat pipe.