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SIMULATION OF THE HEAT TRANSPORT IN A CONTINUOS SOLID WITH HOLE PATTERNS THROUGH FINITE DIFFERENCES

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Abstract. Solid heat simulations are important in industry due to the large number of problems associated with heat buildup in devices. Finding a way to focus heat flows or to isolate certain geometries becomes relevant to solve these problems. Some electronic devices like the 3D integrated analog CMOS circuit have a power density around 100 W/cm2, which must be mitigated to protect the components located in their vicinity from the impact of heat dissipation and temperature rise. The heat equation will be solved using the finite difference method based on a discretization of the full solid domain. Geometry and pattering in addition to high thermal conductivity materials can be used to isolate or rectify heat conduction adjacent to the heat source to minimize both, the magnitude of the total thermal resistance and the length of the heat transfer pathway. A rectangular plate with different hole shapes and sizes is considered in order to perform a controlled management of heat flows in a continuous solid subjected to temperature gradients. The simulations are done with an own code written in C++ and the data visualization was done through MATLAB