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DEVELOPMENT OF DPL-BASED HEAT CONDUCTION SOLVER FOR MULTI-LAYERED ARBITRARY SHAPES: NANO- AND BIO-CASE STUDIES

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In this paper we have investigated the numerical simulation of the non-Fourier dual-phase-lag heat conduction model in 3D Bio-Nano media by developing two novel solvers over the platform of OpenFOAM codes. Solvers are capable of capturing curved boundaries with handling unstructured and structured hybrid meshes with second-order of accuracy in time and space. The temperature distribution in human's hand skin as a Bio-medium in presence of Arteriole, and the newly constructed MoS_2 nanoscale transistor with 1-nm gate length as a nano-medium are presented. Also the structures of both cases are multi-layered with different physical properties. After Verification of numerical results, the thermal fields and peak temperature rise of the transistor are computed.
Keywords: DPL heat model, Bio/Nano, OpenFOAM, Curved Boundary, Multi-layered material