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Analytical modeling of high precision measurement of thermal heat transfer by laser heating ABHISHEK JAIN, Department of Mechanical, Aerospace and Nuclear Engineering, Rensselaer Polytechnic Institute, New York — Study of precise thermal heat transfer due to laser heating of metals and other structures has been found to be of great use in different applications ranging from MEMS, nanostructures and biomedical devices. In this paper an analytical modeling of measuring the temperature at a junction of the thermocouple and the metal surface is done. Analytical treatment is also done to calculate the temperature distribution inside the metal assuming the laser as a point heat source. The metal in consideration is stainless steel and is heated using laser. When a thermocouple is mounted on the metal surface there is a fall in the junction temperature due to the depression of the thermocouple inside the metal, which results in the error in the final measurement. In the present study an analytical investigation is done to measure the error generated due to this depression. Temperature distribution inside the block is also calculated based on heat diffusion equation in cylindrical coordinates.

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