Design and Simulation of a MEMS-Based Flow Sensor Using COMSOL Multiphysics® Software

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Abstract

In this paper, We have designed a Flow sensor based on calorimetric principle using COMSOL Multiphysics® software. The Sensor is capable of measuring the velocity from 0 to 1 m/s with a resolution of 0.001m/s. The system works with intrusive type mechanism in which the fluid flows across the sensor and interacts with heating element and sensing unit. Temperature gradient measured across the inlet and outlet sensing units used as a parameter to calculate the flow rate and velocity of the fluid profile by solving Navier Stokes Fluid Flow equation. Conjugate heat transfer interface and fluid dynamics based mesh are used as special cases for this study purpose.

Reference

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Figures used in the abstract

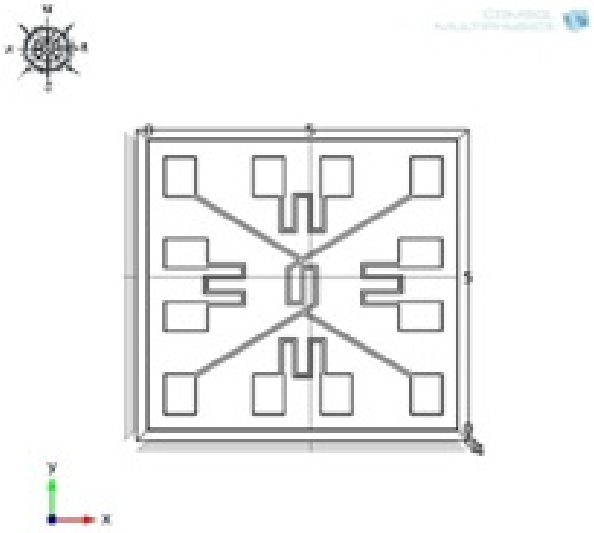

Figure 1: Cross Sectional View of Thermal Sensor.

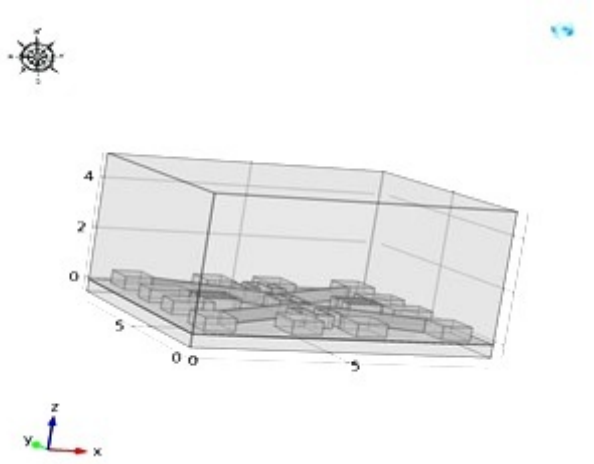

Figure 2: Thermal Sensor with Borosilicate Glass Substrate.

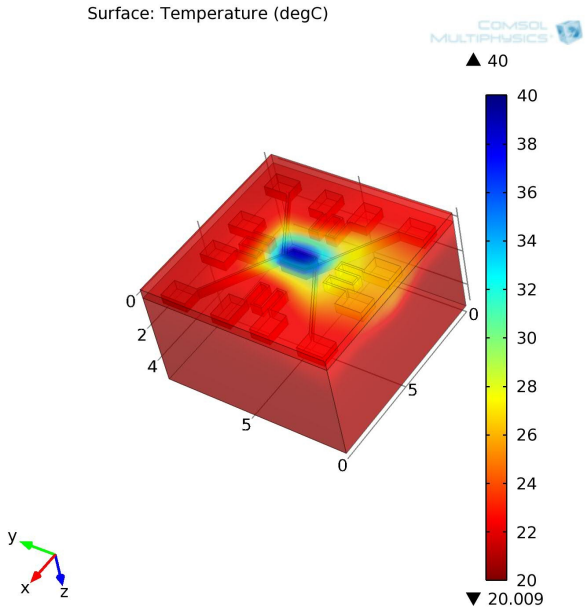

Figure 3: Flow Direction and Heat Dissipation.

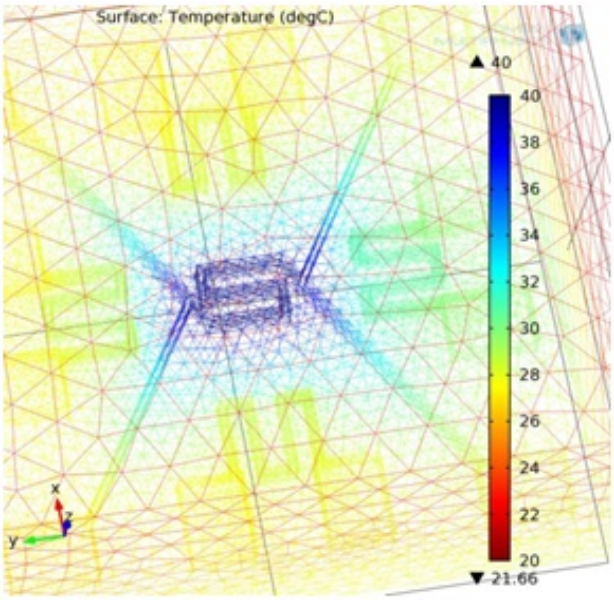

Figure 4: Wireframe view of Heat Dissipation.