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# An experimental study on the thermal conductivity of cerium oxide/ethylene glycol nanofluid: developing a new correlation

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## Abstract

The main aim of this experimental study is to examine the effect of cerium oxide nanoparticles on the thermal conductivity of ethylene glycol. In this way, cerium oxide nanoparticles with the particle diameter of 10-30 nm have been used for making nanofluid samples. The samples were made in volume concentration range of 0.25- 2.5% using a two-step method. Visual observation of nanofluid samples showed that they have acceptable stability. Transient hot wire method was used for measuring the thermal conductivity of the samples. Measurements were done for all samples at temperatures ranging from 25 to 50°C. Measurements showed that the thermal conductivity of nanofluid enhanced with increasing temperature and solid volume fraction. The results also showed that the thermal conductivity of ethylene glycol could enhance by about 22% when the nanoparticles volume fraction reaches 2.5%. This enhancement occurred at 50 °C. Finally, a mathematical correlation was presented to predict the thermal conductivity ratio of CeO<sub>2</sub>/EG using curve-fitting. This correlation, a two-variable function of temperature and volume fraction, showed a linear relationship between thermal conductivity ratio and these variables.

**Keyword:** Nanofluid; Cerium oxide nanoparticles; Volume fraction; Temperature; Thermal conductivity; New Correlation;

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