A Review on the Effect of Nanoparticle Concentration on the Viscosity and Thermal Conductivity of Nanofluids

Santosh Sahu
Mechanical Engineering Department, National Institute of Technology, Raipur, Chhattisgarh, India

Dr. S. P. S. Matharu
Mechanical Engineering Department, National Institute of Technology, Raipur, Chhattisgarh, India

Dr. Ritesh Kumar Dewangan
Mechanical Engineering Department, Krishna's Vikash Institute of Technology, Raipur, Chhattisgarh, India

Abstract

The management of nanofluid properties through nanoparticle concentration is a critical aspect of advancing thermal management and energy transfer technologies. This review is to show how the change in the amount of nanoparticles influences the viscosity and thermal conductivity of nanofluids, especially for use in engineering and industrial applications. It highlights the intricate balance between nanoparticle concentration, particle size, and the properties of the base fluid all of which shape how nanofluids perform thermally. By looking at recent experimental and theoretical studies, the current review explains the mechanisms behind these trends. On Increasing nanoparticle concentration there is boost in thermal conductivity, which improves the heat transfer, but it can also make the fluid more viscous, potentially slowing things down and reducing efficiency. This Review also points out the best concentration ranges for different nanoparticle and fluid combinations and discusses ways to address issues like particle clumping and settling. It stresses the importance of finding the right balance between maximizing heat transfer without making the fluid too thick, to improve performance in real-world uses.

Keywords

Nanofluid, Nanoparticles, Heat Transfer, Thermal Conductivity.