## Abstract

A numerical study of [nanofluid](https://www.sciencedirect.com/topics/engineering/nanofluid" \o "Learn more about nanofluid from ScienceDirect's AI-generated Topic Pages) flow and heat transfer of laminar [mixed convection](https://www.sciencedirect.com/topics/chemical-engineering/mixed-convection) flow over a three-dimensional, horizontal [microscale](https://www.sciencedirect.com/topics/engineering/microscale) forward-facing step (MFFS) is reported. The effects of different step heights and the duct inclination angle on the heat transfer and fluid flow are discussed in this study. The straight and downstream walls were heated to a constant temperature and [uniform heat flux](https://www.sciencedirect.com/topics/engineering/uniform-heat-flux) respectively. The numerical results were carried out for step heights of 350 μm, 450 μm, 550 μm and 650 μm. Different inclination angles were considered to determine their effects on the flow and heat transfer. Ethylene glycol-SiO2 nanofluid is considered with a 25 nm particle diameter and 4% volume fraction. The results reveal that the Nusselt increases as the step heights increase. Additionally, no significant effect of the duct inclination angle is found on the [heat transfer rate](https://www.sciencedirect.com/topics/engineering/heat-transfer-rate) and the fluid flow.