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Experimental investigation of thermal conductivity and tensile strength of iron ore tailings filled polypropylene composite

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Iron ore tailings (IOT) filled polypropylene (PP) composites were produced by reinforcing polypropylene with iron ore tailings which is a waste product. Particle sizes 53 μm, 75 μm and 100 μm were considered for different volume fractions of 0% to 40% at intervals of 5%. The thermal conductivity of the IOT filled PP composites was determined using the transient techniques employed in the KD2 pro thermal analyzer. 30% volume of iron ore tailings gave increase in thermal conductivity of the composite. Tensile test was conducted and the experimental results were compared with theoretical results obtained from suitable mathematical models. It was discovered that the smaller the particle size of the iron ore tailings, the higher the thermal conductivity and tensile strength. The thermal conductivity increases as the volume fraction increase for either particle size. However, the thermal conductivity and tensile strength start to fall from 35% to 40% because the polymer starts to lose its stability at these volume fractions.

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Analysis of heat transfer in a closed cavity ventilated inside

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In this work, we presented a numerical study of the phenomenon of heat transfer through the laminar, incompressible and steady mixed convection in a closed square cavity with the left vertical wall of the cavity is subjected to a warm temperature, while the right wall is considered to be cold. The horizontal walls are assumed adiabatic. The governing equations were discretized by finite volume method on a staggered mesh and the SIMPLER algorithm was used for the treatment of velocity-pressure coupling. The numerical simulations were performed for a wide range of Reynolds numbers 1, 10, 100, and 1000 numbers are equal to 0.01, 0.1 Richardson, 0.5, 1 and 10. The analysis of the results shows a flow bicellular (two cells), one is created by the speed of the fan placed in the inner cavity, one on the left is due to the difference between the temperatures right wall and the left wall. Knowledge of the intensity of each of these cells allowed us to get an original result. And the values obtained from each of Nusselt convection which allows knowing the rate of heat transfer in the cavity. Finally we find that there is a significant influence on the position of the fan on the heat transfer (Nusselt evolution) for values of Reynolds studied and for low values of Richardson handed this influence is negligible for high values of the latter.

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