

The Effect of Geometrical Ratio and Nanoparticle Reinforcement on the Properties of Al-based Nanocomposite Hollow Sphere Structures

Authors : Mostafa Amirjan

Abstract : In the present study, the properties of Al-Al₂O₃ nanocomposite hollow sphere structures were investigated. For this reason, the Al-based nanocomposite hollow spheres with different amounts of nano alumina reinforcement (0-10wt %) and different ratio of thickness to diameter (t/D: 0.06-0.3) were prepared via a powder metallurgy method. Then, the effect of mentioned parameters was studied on physical and quasi static mechanical properties of their related prepared structures (open/closed cell) such as density, hardness, strength and energy absorption. It was found that as the t/D ratio increases the relative density, compressive strength and energy absorption increase. The highest values of strength and energy absorption were obtained from the specimen with 5 wt. % of nanoparticle reinforcement, t/D of 0.3 (t=1 mm, D=400 μ m) as 22.88 MPa and 13.24 MJ/m³, respectively. The moderate specific strength of prepared composites in the present study showed the good consistency with the properties of others low carbon steel composite with similar structure.

Keywords : hollow sphere structure foam, nanocomposite, thickness and diameter (t/D), powder metallurgy

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