عنوان مقاله:

Entropy generation calculation for laminar fully developed forced flow and heat transfer of nanofluids inside annuli

نویسنده:

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خلاصه مقاله:

In this paper, second law analysis for calculations of the entropy generation due to the flow andheat transfer of water–Al₂O₃ and ethylene glycol–Al₂O₃ nanofluids inside annuli is presented. Thephysical properties of the nanofluids are calculated using empirical correlations. Constant heatfluxes at inner surface of the annuli are considered and fully developed condition for fluid flowand heat transfer is assumed. The control volume approach is selected for calculation of theentropy generation. Total entropy generation for different values of the nanoparticles volumefractions at different geometrical ratios is obtained and compared with those of the base fluid.Also, the geometrical ratios at which the minimum entropy generation is achieved are presented.The results show that when the ratio of the annuli length to its hydraulic diameter (L/Dh) exceedssome critical values, adding of the nanoparticles is not efficient. For each value of thenanoparticles concentration, there is a length ratio (L/Dh) at which the entropy generation isminimized.

کلمات کلیدی:

Second law of thermodynamics, Entropy Generation, Nanofluids, Heat transfer, Annuli, Laminar flow