عنوان مقاله:

Entropy Generation in the Supersonic Convergent-Divergent Nozzle

محل انتشار:

سی و یکمین همایش سالانه بین المللی مهندسی مکانیک ایران و نهمین همایش صنعت نیروگاهی ایران (سال: 1402)

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خلاصه مقاله:

The supersonic separator, which is a converging-diverging nozzle, is an advanced separation technology focusing on water vapor removal. The complex nature of the two-phase flow along with the change of the flow regime from subsonic to supersonic along with extreme temperature and pressure changes make the analysis complicated. This research was done to investigate the entropy generation due to temperature and pressure changes in these types of separators. The density-based solver, the realizable k-ε turbulence model, and the virial gas equation of state are used. The pressure distribution and droplet average radius obtained from the numerical model are well consistent with the experimental data. By increasing the temperature from ۶۶۲.۴۵ K to ۶۸۶.۴۳ K at a constant pressure of ۱۳.۸۳ MPa, the total entropy generation rate increased by ۹.۷۵%; By increasing the pressure from ۹.۸۳ MPa to ۱۳.۸۳ MPa at a constant temperature of ۶۷۴.۴۲ K, the total entropy generation rate increased by ۱۵.۹۵%. Also, The Bejan number calculation showed that irreversibility is affected by the effects of fluid friction compared to heat transfer.

کلمات کلیدی:

Supersonic Separator, Non-EquilibriumCondensation, Entropy Generation, Bejan Number,Metastable

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