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CFD study on particle separation performance by shock inception during natural gas flow in supersonic nozzle
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Abstract
Supersonic nozzles with low intensity shock have been reported by Oil and gas sectors ideal equipment for eliminating undesired second phases from natural gas during purification process. In this paper, analytical and numerical methods are developed to predict the location of shock for an axisymmetric convergent-divergent nozzle. Six different shapes of nozzle are examined to demonstrate the impact of nozzle shape on shock position. Results are compared to experimental data obtained from subscale testing to demonstrate the limitation of the numerical technique. The computational fluid dynamics simulation analysis predicts shock appearance when nozzle pressure ratio > 1.2 for almost all geometries. Simulation results have also shown that the shockwave predicted by the elliptical nozzle occurs farthest from the throat compared to the other nozzle shapes at relatively small nozzle pressure ratio. However, as nozzle pressure ratio increases, the shockwave using the hexagonal nozzle is shown to occur farthest from the throat. Copyright © 2016 Inderscience Enterprises Ltd.

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