

Effect of swirling device on flow behavior in a supersonic separator for natural gas dehydration - DTU Orbit (08/11/2017)

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The supersonic separator is a revolutionary device to remove the condensable components from gas mixtures. One of the key issues for this novel technology is the complex supersonic swirling flow that is not well understood. A swirling device composed of an ellipsoid and several helical blades is designed for an annular supersonic separator. The supersonic swirling separation flow of natural gas is calculated using the Reynolds Stress model. The results show that the viscous heating and strong swirling flow cause the adverse pressure in the annular channel, which may negatively affect the separation performance. When the swirling flow passes through the annular nozzle, it will damage the expansion characteristics of the annular nozzle. The blade angles and numbers are both optimized by evaluating the swirling and expansion effects for the supersonic separation.

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