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# Offshore Processing of CO<sub>2</sub>-Rich Natural Gas with Supersonic Separator

Multiphase Sound Speed, CO<sub>2</sub> Freeze-Out and HYSYS Implementation

- Presents the conceptual aspects of offshore processing of raw natural gas with supersonic separators in comparison to processing with conventional technologies
- Discusses in detail the concept and theory of generalized multiphase and multi-reactive speed of sound as a thermodynamic property and how to calculate it in HYSYS process simulators
- Provides a complete theoretical framework for modeling supersonic separators for the removal of condensable species such as water and heavy hydrocarbons from natural gas
- Describes process flowsheets for the removal of water and heavy hydrocarbons from natural gas using supersonic separators, comparing the economic and energy performance with conventional approaches

This book introduces a new and powerful approach based on rigorous process simulations conducted with professional simulators like HYSYS to predict the performance of supersonic separators (SS). The book addresses the utilization of SSs for the offshore processing of CO<sub>2</sub>-rich natural gas as an alternative to Joule-Thomson expansion, glycol absorption, membrane permeation and chemical absorption. It describes and analyzes the conventional offshore processing of CO<sub>2</sub>-rich natural gas, discussing the advantages of SS in terms of cost and power consumption. The book offers a comprehensive framework for modeling SS units, describing the physical principles of SS in detail. The thermodynamic multiphase sound speed is also discussed at the light shed by a classical analysis based on the Landau Model of phase transitions. A complete framework is presented for modelling and simulating SS units within HYSYS environment.

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