

Real gas model and its influence on predicted performance parameters of a compressor

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This talk deals with the extension of the in-house matrix-free coupled finite volume solver for the case of the real gas model. The main motivation was related to flow in turbomachinery in multistage configurations at high pressures. In this case, perfect or so-called pseudo-perfect gas models are subject to inaccuracies and a real gas model must be considered to reliably determine the performance parameters of a turbine or compressor.

However, the commonly used real gas models are computationally very demanding and therefore we propose a simple model based on local linearization of the virial equation. The proposed model allows relatively fast computations of the flow fields in compressors or turbines with accuracy comparable to models based on the cubic equation of state.

The contribution will conclude by showing the influence of the real gas model on the calculated parameters of the axial compressor model.