

Improvement of Parallel Compressor Model in Dealing Outlet Unequal Pressure Distribution

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Abstract : Parallel Compressor Model (PCM) is a simplified approach to predict compressor performance with inlet distortions. In PCM calculation, it is assumed that the sub-compressors' outlet static pressure is uniform and therefore simplifies PCM calculation procedure. However, if the compressor's outlet duct is not long and straight, such assumption frequently induces error ranging from 10% to 15%. This paper provides a revised calculation method of PCM that can correct the error. The revised method employs energy equation, momentum equation and continuity equation to acquire needed parameters and replace the equal static pressure assumption. Based on the revised method, PCM is applied on two compression system with different blades types. The predictions of their performance in non-uniform inlet conditions are yielded through the revised calculation method and are employed to evaluate the method's efficiency. Validating the results by experimental data, it is found that although little deviation occurs, calculated result agrees well with experiment data whose error ranges from 0.1% to 3%. Therefore, this proves the revised calculation method of PCM possesses great advantages in predicting the performance of the distorted compressor with limited exhaust duct.

Keywords : parallel compressor model (pcm), revised calculation method, inlet distortion, outlet unequal pressure distribution

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