

Modern State of the Universal Modeling for Centrifugal Compressors

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Abstract : The 6th version of Universal modeling method for centrifugal compressor stage calculation is described. Identification of the new mathematical model was made. As a result of identification the uniform set of empirical coefficients is received. The efficiency definition error is 0,86 % at a design point. The efficiency definition error at five flow rate points (except a point of the maximum flow rate) is 1,22 %. Several variants of the stage with 3D impellers designed by 6th version program and quasi three-dimensional calculation programs were compared by their gas dynamic performances CFD (NUMECA FINE TURBO). Performance comparison demonstrated general principles of design validity and leads to some design recommendations.

Keywords : compressor design, loss model, performance prediction, test data, model stages, flow rate coefficient, work coefficient

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