Conceptual Design of Axial Flow Gas Turbines for Helium-cooled Reactors

Ji Hwan Kim, Hyeun Min Kim and Hee Cheon NO
Korea Advanced Institute of Science and Technology
Yuseong-Gu, Daejeon, Korea 305-701
Tel:+ 82-42-869-3857, Fax:+ 82-42-869-3895, Email:espero@.kaist.ac.kr

Abstract

The conceptual design tools for axial flow gas turbines were developed using mean-line analysis and meridional flow analysis methods. And it is validated by comparing with the turbomachinery design data of MPBR designed by the industry design tool. The conceptual design tools have ability to produce design point performance within the range of ±1% error comparing with the reference. It turns out that the high-pressure compressor and the high-pressure turbine consist of 8 stages and 4 stages. The analysis of the off-design of gas turbines show that constant speed lines are not steep as the mass flow increases mainly due to the high sonic velocity of helium and low flow coefficient, and the efficiency of the high-pressure is relatively constant over the wide range of pressure ratio.The results of the scaling analysis with 1/2 scale-down gas turbines indicate that the effectsof the non-dimensional mass flow and the non-dimensional speed are stronger than the effect of the Reynolds number in subsonic flow regime.

평행 3중 분류에 의한 비정상 난류 유동장 해석

Analysis of Unsteady Turbulent Parallel Triple-Jet Flow with Temperature Difference

정지훈, 유근종
국립창원대학교
경남 창원시 사림동 9

요약

Thermal stripping 현상을 수반한 비정상 난류유동장을 해석하기 위해 LES 모델을 사용하였다. 검증대상은 평행 3중 분류로 선정하였으며, LES 모델 중 Smagorinsky-Lilly모델을 사용하여, 3-D로 해석을 수행하였다. LES는 온도요동의 크기와 주파수의 평가에 영향을 미치는 난류변수들의 시간에 대한 정보를 도출하였다. 분석결과 LES 모델이 실험결과에 비해 혼합효과를 저평가하고 있음을 알 수 있었다. 차후 세밀한 격자계로 계산을 수행할 것이며 또한 입구측의 난류강도를 조절해서 그 영향을 살펴볼 예정이다.