고온환경하에서 램제트 엔진 연소실의 열구조해석

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Thermo Structure Analysis for Combustor of the Ramjet Engine under High Temperature.

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Key Words: Ramjet engine (램제트 엔진), Thermal stress (열응력), Combustor (연소실)

Abstract : The combustor, diffuser and nozzle are main components of the ramjet engine. The objective of this study is thermo structure analysis of the combustor. The combustor is composed of 17-4 PH stainless steel housing and Inconel 718 liner. Temperature conditions of housing and liner are quite different. The combustor liner is rapidly heated up to 700℃, so that is reached plastic zone locally. The temperature of combustor housing rises to 400℃. The thermal stress of liner is large than housing stress. The nonlinear thermal analysis with mechanical properties of both housing steel and liner inconel such as Young's modulus, thermal expansion coefficient and thermal conductivity is conducted. The analysis of the transient temperature and thermal stress of combustor is carried out the finite element method with code Nastran. The structural assessment of combustor is evaluated.

유화 Pilot 플랜터의 열응력 해석에 관한 연구

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A Study on Thermal Stress Analysis of Emulsification Pilot Plant

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Key Words: Thermal Stress(열응력), Heat Transfer(열전달), Emulsification(유화), Spring Stiffness (스프링 강성), Thermal Expansion(열팽창)

Abstract : In this study, the heat transfer and the thermal stress analysis of emulsification pilot is performed. The heat transfer analysis is performed in order to obtain the temperature distribution data which were used in thermal analysis. The thermal stress analysis is performed to verify stability of the emulsification pilot plant. In other words, the thermal stress analysis is performed to see the failure and the deformation behavior of structure by thermal expansion. For the local thermal stress analysis for each parts, the attached parts are replaced with the equivalent spring which was calculated by displacement of arbitrary force. As boundary conditions for thermal stress analysis, spring stiffness of connected structure is applied for displacement constraints and temperature distribution data is applied as thermal load.