

열복사를 고려한 열기계학적 해석을 위한 유한요소 부영역 결합법의 적용

신의섭[†](전북대) · 진지만^{*}(전북대)

Subdomain-Based Finite Element Method for Thermomechanical Analysis with Thermal Radiation

Eui Sup Shin and Ji Man Jin

Key Words: Subdomain(부영역), Finite Element Method(유한요소법), Thermomechanical Analysis (열기계학적 해석), Thermal Radiation(열복사)

Abstract : A finite element method based on the penalized subdomain-interface framework is proposed for fully-coupled, nonlinear thermomechanical analyses with thermal contact and/or radiation boundaries. In the variational formulation, a penalty functional scheme is adopted for connecting subdomains and interfaces that satisfy continuity requirements. As a consequence, the domain can be arbitrarily divided to independently-modeled subdomains without considering the conformity of meshes. Since nonlinearities due to the radiation boundaries can be localized in a few subdomains, the computational efficiency is increased with appropriate algorithms. By solving numerical problems, these advantageous characteristics are confirmed carefully.

Strength Assessment of Pump Tower and Base Support of MARK-III LNG Insulation System

Han Sangmin, Y.V. Satish Kumar and Suh Yongsuk

MARK-III LNG 방열시스템의 펌프타워 및 베이스서포트 강도 평가

한상민[†](삼성중공업) · 사티쉬쿠마^{*}(삼성중공업) · 서용석^{*}(삼성중공업)

Key Words: LNG Insulation System (LNG 방열시스템), Pump Tower and Base Support (펌프타워 및 베이스서포트)

Abstract : The present paper discusses the thermo-mechanical strength analysis of pump tower and pump tower base support of MARK-III insulation system of LNG carriers. The loading condition includes the sloshing, inertial, thermal, hydrostatic, gravity loads and reaction forces, which are assessed under pessimistic conditions. A very pragmatic idealization of the insulation system is implemented in order to simulate the realistic behaviour of the structures under the given loading conditions. The pump tower and pump tower base support are found to have high stresses at 20% filling ratio of the tank. The paper emphasizes the loading scenarios, idealization schemes and the behaviour of insulation and pump tower systems.