

## 원자로 주 배관계의 진동 건전성 시험

\*김 연환, 김 희수, 구 재량, 배 용채, 이 현(한전 전력연구원)

### Verification Test for Primary Reactor Piping in Nuclear Power Plant

Yeon Whan Kim, Hee Su Kim, Jae Raeyang Koo, Yong Chae Bea, Hyun Lee

**Key Words** : vibration, piping, verification,

**Abstract** : The piping verification tests were performed in order to verify the structural integrity during initial operation of the reactor coolant systems and the primary heat transportation systems of nuclear power plants by KEPRI in Korea. The tests were conducted at full operating temperature and pressure. The objective is to evaluate the possibility of excessive load generating on piping, piping supports, and reactor structures etc. in the steady normal operation and expected pump transient conditions. As a result, the measured vibrations have been shown acceptable level according to ASME/ANSI OMa-Standard, Part 3.

## 이동질량과 등분포종동력이 외팔보의 동특성에 미치는 영향

손인수<sup>†</sup> (동의대 원) · 윤한익<sup>\*</sup> (동의대) · 김현수<sup>\*\*</sup> (동의대 원)

### Influence of Moving Mass on Dynamic Behavior of a Cantilever Pipe Subjected to Uniformly Distributed Follower Forces

In-soo Son, Han-Ik Yoon and Hyeon-Soo Kim

**Key Words** : Cantilever Pipe(외팔 관), Moving Mass(이동질량), Follower Force(종동력)

**Abstract** : The vibrational system of this study consists of a cantilever pipe conveying fluid, the moving mass upon it and an attached tip mass. The equation of motion is derived by using Lagrange equation. The influences of the velocity of moving mass and the uniformly distributed tangential follower force have been studied on the dynamic behavior of a cantilever pipe by numerical method. While the moving mass moves upon the cantilever pipe, the velocity of fluid flow increase, the tip displacement of cantilever pipe conveying fluid is decreased. After the moving mass passed upon the cantilever pipe, the tip displacement of pipe is influenced by the potential energy of cantilever pipe and the deflection of pipe with the effect of the moving mass and gravity. As the velocity of fluid flow increase, the natural frequency of the system is decreased at second mode and third mode, but it is increased at first mode.