

## 유한요소해석을 이용한 유체를 수송하는 파이프의 동특성 해석 Dynamic Analysis of a Pipe Conveying Fluid by using Finite Element Method

박종호<sup>†</sup>(한양대 원) · 정두한<sup>\*</sup>(한양대 원) · 정진태<sup>\*\*</sup>(한양대)  
Jongho Park, Duhan Jung and Jintai Chung

**Key Words** : Dynamic analysis (동특성 해석), pipe conveying fluid(유체를 수송하는 파이프).

**Abstract** : Dynamic characteristics of a semi-circular pipe conveying fluid are analyzed when the pipe is clamped at the both ends. In this study, the semi-circular pipe was modeled as a kind of the Euler-Bernoulli beam for the slenderness assumption. The partial differential equations of motion were derived by using the extended Hamilton principle. The numerical scheme by using the finite element method was applied to obtain the discretized equations. Using this method, the dynamic characteristics of the pipe were analyzed for the variations of the fluid velocity. As the fluid velocity increases, the natural frequencies of the pipe decrease. Furthermore, the pipe becomes unstable by divergence in the first mode when a critical fluid velocity is exceeded.