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Seismic Response Analysis of Very Large Floating Structure and Dolphin System

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Synopsis :

Seismic response and risk analyses of a very large floating structure supported with many dolphins were carried out to study the mutual interaction and its instability of the floating-dolphin system against strong ground motion in an earthquake. The

メガフロートシステムの地震応答特性*

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Seismic Response Analysis

of Very-Large Floating Structure and Dredging System

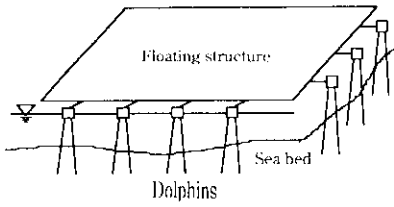


Fig. 1 Floating structural system supported with dolphins

$$k_i^2 = m \rho \omega_{ni}^2, \quad \omega_{ni} = \frac{\omega_{1i} \omega_{2i}}{\sqrt{\omega_{1i}^2 + \omega_{2i}^2}} \dots \dots \dots (4)$$

2.2 地震入力モデル

超大型浮体構造物に作用する入力地震波は、以下に定義する非定常パワースペクトル密度²⁾ $S(\omega, t, x)$ を用いて式 (5) で表現できる。

$$\ddot{z}(t, x) = \sum_{k=1}^n \sqrt{2S(\omega_k, t, x)} \Delta\omega \exp \{i(\omega_k t + \phi_k)\} \dots \dots \dots (5)$$

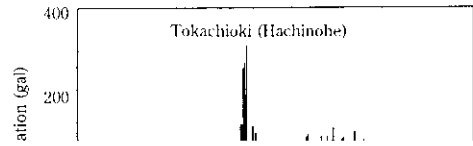
ここで、 $\omega_k = k\Delta\omega$, $\Delta\omega = \omega_n/n$, ω_n は周波数の上限値そして ϕ_k は位相角度。

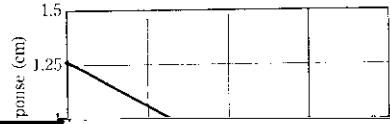
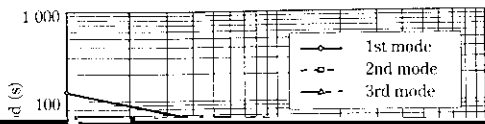


$$K_x(\omega_k, x_i, \psi) = \frac{m_i}{M} b_x(\omega_k, x_i, \psi) (2ih_i\omega_k + \omega_{ni}^2) H_i(\omega_k)$$

$$K_y(\omega_k, y_j, \psi) = \frac{m_j}{M} b_y(\omega_k, y_j, \psi) (2ih_j\omega_k + \omega_{nj}^2) H_j(\omega_k)$$

$$K_z(\omega_k, z_i, \psi) = \frac{m_i}{M} b_z(\omega_k, z_i, \psi) (2ih_i\omega_k + \omega_{ni}^2) H_i(\omega_k)$$





いずれの曲線も時刻 32 s 前後までは初期値に等しい一定値を保持

ドルフィン系の振動特性、地震応答特性を検討した。さらに、ドル