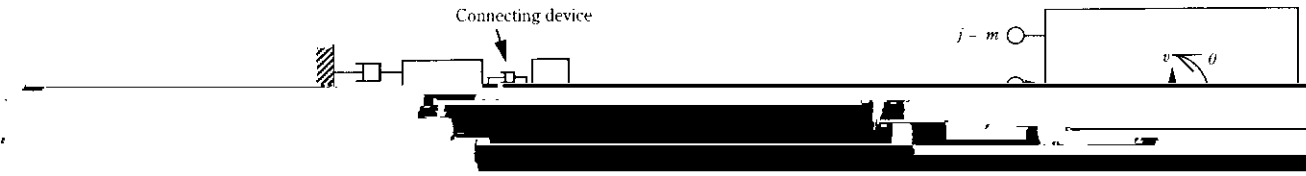
KAWASAKI STEEL TECHNICAL REPORT

Seismic Response Analysis of Very Large Floating Structure and Dolphin System*

Synopsis:

Seismic response and risk analyses of a super floating structure supported with many dolphins are carried out


Connecting device
j - m
v
θ

in which M, I, C and C_θ are the mass, inertia moment, and damping coefficients (for translation mode and rotation mode) of the VLFS. Using the response vector $Q = \{u, v, \vartheta\}$ and its generalized motion vector q and characteristic matrix $[\phi]$, we may obtain the following equation of motion in the generalized coordinates:

[redacted]

in which

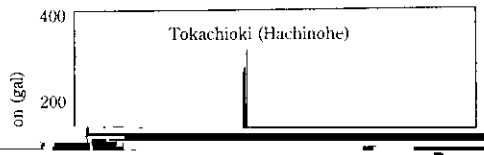
[redacted]

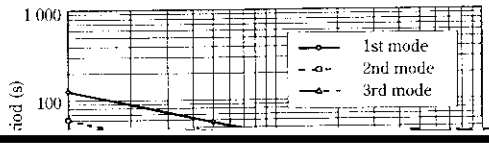
tiates the rotational motion, the residual dolphins might be damaged in succession, so that the progressive failure of the dolphins occurs.

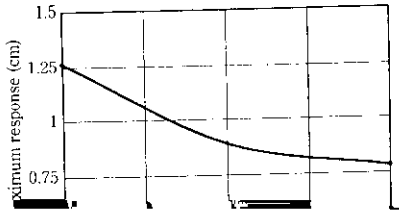
Let us define the event of the system failure that the rotational response of the VLFS exceeds the critical value θ_c given in the following form:

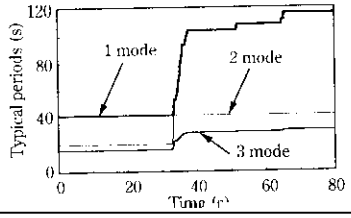
[redacted]

where the response $\theta_{D(d1, d2, \ldots, dm)}$ of the VLFS is to be controlled by the global stiffness which is generated from any combination D(d1, d2, ..., dm) of damaged and


400
Tokachioki (Hachinohe)
200
on (gal)


1 000
100
iod (s)
1st mode
2nd mode
3rd mode

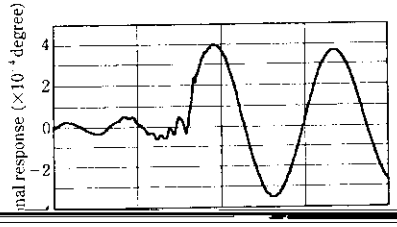




Traveling wave velocity (m/s)

Fig. 8 Earthquake response for several traveling wave velocities[4]

process



5 Conclusion

Seismic response analysis is conducted for a numerical model of a very large floating structure (VLFS).

Two types of earthquakes, one initiated from tectonic plate boundary in the Pacific Ocean and the other from a near-field fault rupture, are applied to assess the instability of the structural system.

Numerical results indicate that