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Arundhuti Banerjee, Tanusree Chakraborty, Vasant Matsagar



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**DYNAMIC ANALYSIS OF AN OFFSHORE MONOPILE FOUNDATION USED AS
HEAT EXCHANGER FOR ENERGY EXTRACTION**Arundhuti Banerjee¹, Tanusree Chakraborty², and Vasant Matsagar³**ABSTRACT**

In the present study, a novel concept of incorporating a heat exchanger system in an existing offshore wind turbine- monopile foundation and its effect on the stress-strain response of the structure is investigated. Thermo-mechanical analysis of the steel monopile with fluid carrying pipes was carried out using finite element method (FEM) considering heat transfer and structural analyses. The effect of offshore loading is taken into account using random wind and wave loading simulated using the Kaimal and the Pierson Moskowitz spectra, respectively. The combined effect of thermal as well as offshore loading on the monopile, resultant pore pressure development in soil due to the loads, the axial and radial stresses and strains in the structure and the shear stresses in soil were studied in detail. The strains and displacement of the structure are checked against the serviceability limits for the offshore wind turbine structure and it has been observed that the combination of offshore as well as thermal load on the monopile foundation along with the duration of the load, affects the stresses and strains in the structure significantly.

Keywords: Ground Heat Exchanger (GHE), Offshore Wind Turbine (OWT), Pore Pressure, Thermal Load, Wind Loading, Wave Loading.

¹ Research Scholar, Department of Civil Engineering, Indian Institute of Technology (IIT) Delhi, Hauz Khas, New Delhi - 110 016, India.
E-mail: arundhuti.banerjee@civil.iitd.ac.in, Contact No. +91-11-2659-1268

² Associate Professor, Department of Civil Engineering, Indian Institute of Technology (IIT) Delhi, Hauz Khas, New Delhi - 110 016, India.
E-mail: tanusree@civil.iitd.ac.in, Contact No. +91-11-2659-1268

³ Associate Professor, Department of Civil Engineering, Indian Institute of Technology (IIT) Delhi, Hauz Khas, New Delhi - 110 016, India.
E-mail: matsagar@civil.iitd.ac.in, Contact No. +91-11-2659-1225

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