Structural Health Monitoring of Offshore Structures Using Wireless Sensor Networking under Operational and Environmental Variability

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Abstract : The early-stage damage detection in offshore structures requires continuous structural health monitoring and for the large area the position of sensors will also plays an important role in the efficient damage detection. Determining the dynamic behavior of offshore structures requires dense deployment of sensors. The wired Structural Health Monitoring (SHM) systems are highly expensive and always needs larger installation space to deploy. Wireless sensor networks can enhance the SHM system by deployment of scalable sensor network, which consumes lesser space. This paper presents the results of wireless sensor network based Structural Health Monitoring method applied to a scaled experimental model of offshore structure that underwent wave loading. This method determines the serviceability of the offshore structure which is subjected to various environment loads. Wired and wireless sensors were installed in the model and the response of the scaled BLSRP model under wave loading was recorded. The wireless system discussed in this study is the Raspberry pi board with Arm V6 processor which is programmed to transmit the data acquired by the sensor to the server using Wi-Fi adapter, the data is then hosted in the webpage. The data acquired from the wireless and wired SHM systems were compared and the design of the wireless system is verified.