

Corrosion Monitoring in Marine Environments Using Electrochemical Impedance

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The offshore structures are exposed in the various environments, namely, marine atmosphere, splash zone, tidal zone, underwater zone and the bottom area of the sea. It is known that the corrosion rate and the corrosion mechanism vary depending on the kind of environments. However, almost investigations concerning the marine corrosion have been carried out by the exposure tests in the seashore environments. The corrosion monitoring should be necessary to investigate the details of corrosion resistances and corrosion mechanisms in marine environment that involves significant variation due to the high and low tide and the splash.

In the present paper, the concentric ring type electrode consisting of the ring and disk electrodes of carbon steels, were fabricated as the sensor for corrosion monitoring. Furthermore, the corrosion performance of the developed electrode was examined in the apparatus to simulate the marine environment. The polarization resistance was determined from the electrochemical impedance between the ring and disk electrodes at low and high frequencies. The time variation of the polarization resistance was measured under the high and low tide of test water, and the corrosion behaviors of carbon steel under various environment were discussed.