Effect of Magnetic Field on the Corrosion Behaviour of Carbon Steel in Static Seawater

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We investigated the effect of magnetic field on the corrosion behaviour of carbon steel in static seawater using finite element electrochemical simulations and electrochemical experiments. We observed that by changing the magnetic field strength and orientation, we can control the corrosion behaviour of carbon steel. Carbon steel is a magnetic material. We observed the effect of magnetic gradient force, which was introduced by self-magnetization, on the corrosion behaviour except for the Lorentz force. The analysis results indicate that the introduced magnetic gradient force is essential for inhibiting the corrosion behaviour of carbon steel. These results demonstrated that the effect of magnetization cannot be ignored during the electrochemical corrosion process of magnetic materials.

Keywords: Iron, Magnetic field, Corrosion, Seawater

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