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Enhancement of the Corrosion Resistance of Fastening System of Ballasted Railway in Sandy Desert by Using Nano-Coating

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Abstract : Railway as one of the most important transportation modes, passes through various areas with different conditions inevitably, and in many countries such as China, United States, Australia, and Iran, it passes through sandy desert areas. One of the main problems in these areas is the movement of sand, causing various damages to ballasted railway track such as corrosion in the railway fastening system. The soil composition of some desert areas like Fahraj in Iran consists of sand and salt. Due to the movement of sand and corrosive ions of salt, the fastening system of the railway is corroded, which, in turn, reduces the thickness of the components and their life span. In this research, the Nano-coating for fastening system of the railway is introduced, and its performance has been investigated in both laboratory and field tests. The Nano-coating of the fastening system consists of zinc-rich, epoxy, polyurethane, and additive, which is produced through Nano technology. This layer covers the surface of the fastening system and prohibits the chemical reactions, which result in corrosion. The results of Electrochemical Impedance Spectroscopy (EIS) indicate that corrosion resistance increases 315 times by using nano-coating, salt spray test results demonstrate that nano-coated components remained intact after 1000 hours.

Keywords : ballasted railway, Nano-coating, railway fastening system, sandy desert
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