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## PROPERTIES OF THE STEEL-MORTAR INTERFACE DERIVED BY IMPEDANCE SPECTROSCOPY IN DIFFERENT ENVIRONMENT AND CURING CONDITIONS

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In practice, reinforced concrete structures may encounter different kinds of curing conditions due to the weather (sun radiation, air moisture and wind), nearby external environment (seawater, attack of stray current arising from nearby railways), or human factors (insufficient curing period). In some extreme conditions, the corrosion of embedded steel will occur at early age, and the pore structure of cementitious material matrix can also be influenced. One of the significant consequences is the premature failure of steel-matrix interface, which plays important role for the integrity of a structure during the subsequent service life. This phenomenon leads frequently to early deterioration and eventually to risky situations for the stability of structures. In any case, the economic costs inherent to reparation works are considerable.

Therefore, the state and properties of the steel/cement-based material interface is to be monitored from early ages, especially under extreme operating conditions. As one of the nondestructive testing methods, electrochemical impedance spectroscopy (EIS) can be employed to account for properties at the steel/cement paste interface. EIS measurements are very useful since they provide the possibility of correlating the dielectric properties and the microstructure of a cementitious material (derived from the high frequency region), with the corrosion behavior of the embedded steel (derived from the low frequency region).

In this work, to simulate different curing conditions, standard curing for 28d and “on-air” curing after 24h were employed. Different groups of reinforced mortar specimens of the same mixture were designed according to the existence or coexistence of chloride, stray current, and anodic polarization. The steel-mortar interface properties with age and under different curing conditions was monitored by EIS measurement. The paper presents the evolution of the fitting parameters, corresponding to the cementitious material matrix, embedded steel and interaction between them are explained and compared in terms of different curing conditions. This research is expected to clarify that the, curing conditions in unusual work environment (as for example stray current conditions) must be taken into account regarding the behavior of steel-matrix interface at early age, and some curing methods must be put into practice in order to obtain satisfactory performance of the reinforced structure before the structure is used at full operational capacity.

**Keywords:** steel-mortar interface, curing conditions, impedance spectroscopy

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