A METHOD FOR CORROSION-FATIGUE LIFE PREDICTION

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It is well recognized that environment has significant effects on the failure of cyclically loaded members/structures Existing experimental data indicates that fatigue life is much shorter in corrosive environment that in more inert environment such as a dry air or vacuum. This paper presents a method and strategy to predict/estimate life under corrosion-fatigue. A corrosion fatigue factor k_{corr} is defined as the ratio of the fully-reversed stress amplitude in air, $(\Delta\sigma_a)_{air}$, over that in corrosive environment, $(\Delta\sigma_a)_{corr}$, for a given fatigue life in terms of a number of cycles to failure, N_f, i.e. $k_{corr} = (\Delta\sigma_a)_{air}/(\Delta\sigma_a)_{corr}$ at the same N_f. The corrosion fatigue factor resembles the widely used fatigue notch factor k_f. The proposed strategy requires the S-N curve in air and the corresponding k_{corr} factor. Experimental data for three materials, namely 7075-T651, 6161-T561 and 4140 steel tested in laboratory air and 3.5% of NaCl solution were used to illustrate and validate the proposed method. A fairly good agreement is demonstrated in terms of the correlation among air and corrosion-fatigue data.