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# Prediction of Stress Corrosion Cracking in Chloride Solution

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## Summary

Potential fluctuation of type 304 stainless steel during stress corrosion cracking was measured in 25 mass% $MgCl_2$ (353K) solution. The power spectrum distribution of the observed fluctuation was computed by use of FFT algorithm. During the early stage of stress corrosion cracking, which is the period of small cracks propagating from a pit but still barely visible by the naked eye, the power spectrum distribution had a clear peak and its frequency was within the range of 8 to 10 mHz. It was presumed that a crack propagated on the surface of the specimen with the connection of microcracks, which had been generated along coarse slip step lines in front of the crack tip. The correlation between the number of the microcracks on the specimen surface and the number of observed fluctuations was examined to estimate the origin of the potential fluctuation. The former value was computed from the division of the whole length of the surface crack-propagation trace by the average length of the microcracks. The latter one was calculated from the peak frequency of the power spectrum. As a result, both of the numbers showed a linear relation. It was speculated that the fluctuation was generated by the rapid formation of a bare metal surface and its repassivation, with the connection of the microcracks. The shifts of the peak frequency of the power spectrum distribution with the applied stress was measured and the minimum stress for the crack propagation in the early stage of stress corrosion cracking was estimated.