Prediction of Flow Assisted Corrosion with OpenFOAM

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Flowing of electrolyte accelerates the speed of corrosion of metals, which is called the flow assisted corrosion (FAC). Prediction of FAC is important issue in order to serious accidents by the corrosion.

This research developed a prediction method for FAC combining the fluid dynamics simulation and electrostatic simulation with OpenFOAM. First, the polarization curve is modeled as a function of the fluid properties on a specimen in laboratory experiment and fluid dynamic simulation. Next, a distribution of the fluid properties for a target structure is numerically estimated and then the polarization condition on the target is defined based on the estimated properties. Finally, in order to obtain the distribution of the current density on the target, an electrostatic analysis is carried out using the polarization curve as boundary conditions.

The effectiveness of the present prediction method is demonstrated by comparison between experimental and estimated results.