Int. J. Electrochem. Sci., 14 **(2019)** 2560 – 2573

International Journal of ELECTROCHEMICAL SCIENCE
www.electrochemsci.org

Numerical Simulation and Experimental Validation of the Erosion Behaviour of X65 Pipeline Steel under Different Flow Velocities and Sand Concentrations

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doi: 10.20946/2019.03.67

Received: 4 November 2018 / *Accepted:* 14 December 2018 / *Published:* 7 February 2019

The erosion behaviour of X65 pipeline steel in simulated formation water was investigated under different flow velocities and sand concentrations by using numerical simulation and experimental methods. In the numerical simulation, the geometry model was first built according to the erosion loop system in the experimental test, and then the shear stress transport (SST) *k-ω* turbulence model and the discrete phase model (DPM) were applied to simulate the fluid path and the erosion rate during the erosion process. In the experimental test, the erosion rate of X65 steel was determined under different flow velocities and sand concentrations by using a water-sand erosion loop system. The numerical simulation and experimental results showed that the erosion rate of X65 steel clearly increased with the increasing flow velocity and sand concentration, and there is good agreement between the numerical simulation erosion rate and the experimental results.

Keywords: erosion, numerical simulation, experimental validation, flow velocity, sand concentration

FULL TEXT