



Research on optimal radius ratio of impellers in an oxidation ditch by using numerical simulation

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ABSTRACT

Impellers are the main power source for oxidation ditches. Impeller radius has an important influence on the velocity distribution and the flow field structure in oxidation ditch channels. In this paper, the relation between the size of impeller radius and the structure of flow field in an oxidation ditch was studied by using the two-phase gas–liquid model and the 3D Realizable k – ϵ turbulence model. The pressure implicit with splitting of operators algorithm was used for the solution of velocity and pressure. The volume of fluid method was used to simulate the free surface. The research results show that when the ratio of the impeller radius to the diameter of the oxidation ditch channel bend, r/d , is 0.218, the percentage of the fluid with velocity greater than 0.3 m/s to the entire fluid is the greatest, and the length of the backflow region in straight channels is relatively shorter. The ratio of impeller radius to the diameter of an oxidation ditch channel bend, r/d , with a value of 0.218, is called the optimal impeller radius ratio.

Keywords: Oxidation ditch; Impeller; Optimal radius' ratio; Numerical simulation; Flow field

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