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Effect of Wearing in Impeller Blades of a Denver Flotation Cell on Hydrophobic Silica Flotation at Laboratory Scale

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Flotation tests in laboratories are commonly carried out using Denver flotation cells of laboratory size. Since economical and performance impacts due to equipment age can be less obvious at a laboratory-scale than at an industrial-scale, the condition of parts of the cell is overlooked. Maintenance of damaged or old parts might not be carried out. Usually, these parts are not properly replaced after a certain period of use and replaced only when malfunctions occur. Most of the erosion caused by solid particles during the flotation process occurs in the impeller. Therefore, in this study, the effect of wearing of the impeller in a Denver cell on bubble-particle attachment rates was investigated by Computational Fluid Dynamics (CFD) simulations. The focus of the wearing was in the blades of the impeller. Complete wearing, half wearing, and no wearing are the three different conditions of wearing that were simulated. Simulations of flotation were conducted using a hydrophobized silica of 60, 120, and 240 μm. Operation parameters included an impeller speed of 1200 rpm, a constant air injection of 2 l/min, and a constant bubble size of 1 mm. The preliminary simulation results show that overall bubble-particle attachment rates inside the flotation cell are sensitive to changes according to the impeller wearing, and thus, recoveries can vary according to the damage or erosion in the impeller. Acknowledgements: This research was supported by the Korea Energy and Mineral Resources Engineering Program (KEMREP).

References

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