

### Three-dimensional Numerical Modeling for Optimization of Operating Performances in Membrane Bioreactor

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Biological membrane processes have many advantages including improved treatment efficiency for organic matters and nitrogen components by maintaining high microorganism concentration in the reactor, thus solving the problems of traditional wastewater treatment processes. Thus, in this study, a vertical membrane bioreactor was proposed and the optimal air flowrate, which is injected from the bottom of the reactor to control of fouling by particulates in wastewater and improve the activity of microorganisms, was determined. The flow characteristics in the reactor by the input air from the bottom of the reactor were performed through a three-dimensional numerical modeling of the membrane bioreactor. The mixing intensity and kinematic viscosity of wastewater and air inside the membrane reactor are showed. Cavitation effect occurs at the front bottom of the reactor by the high speed airflow inside the wastewater, therefore the mixing intensity and kinematic viscosity of wastewater are decline. However, the mixing intensity and kinematic viscosity of wastewater are high due to sufficient mixing in the recirculation zone of MBR.