Abstract Submitted
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Assess and improve the sustainability of water treatment facility using Computational Fluid Dynamics. JIE ZHANG, ANDRES TEJADA-MARTINEZ, University of South Florida, HONGXIA LEI, City of Tampa Water Department, QIONG ZHANG, University of South Florida — Fluids problems in water treatment industry are often simplified or omitted since the focus is usually on chemical process only. However hydraulics also plays an important role in determining effluent water quality. Recent studies have demonstrated that computational fluid dynamics (CFD) has the ability to simulate the physical and chemical processes in reactive flows in water treatment facilities, such as in chlorine and ozone disinfection tanks. This study presents the results from CFD simulations of reactive flow in an existing full-scale ozone disinfection tank and in potential designs. Through analysis of the simulation results, we found that baffling factor and CT10 are not optimal indicators of disinfection performance. We also found that the relationship between effluent CT (the product of disinfectant concentration and contact time) obtained from CT transport simulation and baffling factor depends on the location of ozone release. In addition, we analyzed the environmental and economic impacts of ozone disinfection tank designs and developed a composite indicator to quantify the sustainability of ozone disinfection tank in technological, environmental and economic dimensions.

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