

Abstract Submitted
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High Schmidt Number Washout of Sodium Hypochlorite or a Viscosifying Solute Shielded by Topography.¹ DAHHEA MIN, PAUL F. FISCHER², ARNE J. PEARLSTEIN, Department of Mechanical Science and Engineering, University of Illinois at Urbana-Champaign — In many cleaning applications, including washing of fresh-cut produce, surface topography shields soluble contaminants from “washout.” Here, we report computations of washout by two-dimensional flow downstream of a backward-facing step, with a contaminant initially confined to a square domain just downstream of the step, with edge length equal to the step height. We consider three cases. In the first, we focus on removal of NaClO for Reynolds numbers (Re) of 10 and 100 (based on step height) at a Schmidt number (Sc) of 2650. For $Re = 100$, there is a time in the washout process when the maximum concentration shifts from the relatively inaccessible bottom corner behind the step, to a point in the interior of the recirculation zone downstream of the step. The size of the recirculation zone affects washout efficacy, corresponding to a strong Re dependence on Re . In the second case, we model washout of organic exudate that leaks from freshly cut produce, using data for the viscosifying sugar acid sodium gluconate (NaG) at $Re = 100$ and an infinite-dilution Sc of 4165, accounting for the dependence of viscosity on concentration. Finally, we show results for the case in which NaClO is present in the free-stream, and reacts with NaG downstream of the step.

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