
Contribution ID: **301** Type: **Oral Presentation**

# Sherwood number correlation for reverse osmosis membrane systems in turbulent regime

*Wednesday, 1 June 2022 11:45 (15 minutes)*

Evaluating and understanding mass transfer in reverse osmosis membrane (ROM) systems is critical for improving their filtration performance. Previous studies show that the Sherwood number (Sh), a dimensionless measure of mass transfer rate, is significantly impacted by Reynold number (Re) in laminar regime. Although Reynolds number in ROM systems could reach values around 10,000, to the best of our knowledge, the impact of turbulent flows on Sh-Re correlation in ROM system has never been investigated. In this work, we develop a numerical framework in the OpenFOAM platform which couples flow, mass transfer and foulant accumulation for both laminar and turbulent regimes. Reynold-Averaged Navier-Stokes equations (RANS) and mass transport equations are employed and validated to simulate turbulent flow and mass transport in ROM systems at high Re numbers. For the first time, Sh-Re correlation in spacer-filled channels are numerically derived for ranges of Re numbers that span both laminar and turbulent regimes. The Sh-Re correlation, calculated numerically, are in agreement with theoretical calculations in both low and high-Re flows. Our results show that mass transport is significantly enhanced in turbulent flows due to unsteady vortex shedding and increase of effective diffusivity.

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## Time Block Preference

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## Participation

Unsure

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