Mass transfer from a core-shell cylindrical reservoir in cross flow
CLEMENT BIELINSKI, BADR KAOUI, Biomechanics and Bioengineering Laboratory, Universite de technologie de Compiegne — Mass transfer from a core-shell cylindrical reservoir subjected to a channel cross flow is numerically studied using lattice-Boltzmann simulations. The contribution of both the flow and the solute shell permeability to mass transfer is quantified by the Sherwood number, which is the dimensionless mass transfer coefficient. The transition from steady laminar flow to unsteady flow impacts the mass transfer, and thus, the release efficiency. Mass transfer is also considerably altered by the presence of a coating shell, which slows down the solute release. An empirical correlation, highlighting the contribution of the solute shell permeability, has been extracted from the obtained numerical data. The proposed correlation is useful for applications in controlled mass transfer from cylindrical reservoirs endowed with a coating semi-permeable shell.

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