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Non-additive entrance effects in ionic conductance of an array of solid-state nanopores ALESSANDRO GADALETA, CATHERINE SEMPERE, SIMON GRAVELLE, REMY FULCRAND, ALESSANDRO SIRIA, ILM, Université Lyon 1 and CNRS, UMR 5306, Villeurbanne, France, LYDÈRIC BOCQUET, ILM, Université Lyon 1 and CNRS, UMR 5306, Villeurbanne, France; MIT, Department of Chemical Engineering, Cambridge, MA — The ionic conductance of small pores has long been a topic of interest in many diverse areas of application, starting from electrophysiology in the 1950s to research on ultrarapid DNA sequencing and ion selective membranes in recent times. The so-called access resistance, induced by the convergence of field lines from the electrode to the pore, gives a significant contribution to the total ionic resistance. Here we investigate, experimentally and numerically, the access resistance of an array of solid-state nanopores, and show that it is not additive. We show how this problem can be approximately solved with simple electrostatics, presenting a matrix formalism which allows to quickly estimate the entrance effects in any given geometry.

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