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**Efficient Desalination with Fractal Absorbers** MARTIN SINGLETON, Physics Department, UIUC, GREGOR HEISS, Institut fuer Physikalische Chemie, Ludwig-Maximilians-Universitaet Munich, ALFRED HUBLER, Physics Department, UIUC — A class of Ramified graphs (RG) is introduced as Iterated Function Systems (IFS) to optimally design networks for efficient reverse osmosis desalination in deep seawater. Different forms of the IFS are presented, along with a corresponding contractivity factor $s_c$, in order to identify the attractors of the systems and their fractal dimension. Using the analogy to electrostatics, the diffusion equation is solved for the desalination systems under three different boundary conditions, i) all nodes having the same pressure difference across the absorbers, ii) all nodes producing permeate at identical rates, and iii) each node having the same salt node strength. Optimal branching angles and branch length ratios are found by phase-space and discrete simulated annealing search techniques for each boundary condition, which either maximize production of permeate or minimize expenditure of energy for different fixed numbers of absorbers. Dependence of desalination recovery ratios on the geometry and fractal dimension of the RG is also explored.

Martin Singleton
Physics Department, UIUC

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