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Salt precipitation in porous media and multi-valued solutions

Problems of salt precipitation in soil and porous rock through evaporation of saline water are formulated as a generalized Stefan problem. We derive similarity solutions and show that the solutions have two branches. One of them is presumably stable and another is unstable. These solutions converge and then coincide due to change some parameters. As a result the similarity solutions cease to exist above the branch point. Numerical experiments demonstrate that the branch point corresponds to the sealing of porous media when solid salt fully occupies porous space.