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Transitional behavior of convective patterns in porous media: Insights from basin stability analysis HAMID KARANI, CHRISTIAN HUBER, Georgia Institute of Technology — The present study investigates the transitional behavior of convective modes in Horton-Rogers-Lapwood convection (HRLC). We first provide new pore-scale numerical and experimental evidences on the variation of the stability level of single-cell and double-cell convection modes in a 2D HRLC problem. In order to interpret this transitional behavior, we employ the concept of basin stability and develop a basin stability diagram of the first four convection modes in HRLC. This is in contrast to the standard bifurcation analysis of HRLC using linear stability analysis and continuation techniques, which only provides local information about the (range of) existence, and any possible co-existence of different convection modes. The present basin stability analysis of HRLC not only provides the local information about the (co-)existence of different patterns, but also, it determines their relative stability as well as how the basin of stability of these modes contract or expands as the Rayleigh number varies. The results of the present study show how establishing the dependence of basin stability on the Rayleigh number is essential to analyze the transition between different convection patterns observed experimentally and numerically.

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