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In this talk, we discuss 2×2 linear systems of iterative equations and classify the solution $(0, 0)$. As in the case of 2×2 linear systems of differential equations, the study leads to an analysis of the eigenvalues and eigenvectors of the system matrix. However, the phase portraits of the iterative case exhibit more complicated behaviors, some of which are quite remarkable. The phase portraits for 2×2 iterative systems were outlined in a systematic fashion by Hubbard and West in the companion book to their pioneering software MacMath. However the behavior of the phase portraits for the many borderline cases in the Trace-Determinant plane have not been investigated in detail. The purpose of this paper is to fill in these details. We use interactive software developed by Hubert Hohn of Art Media Labs for this exploration. We include the general solutions for each case in terms of eigenvectors and introduce generalized eigenvectors where required. We point out some applications where the behavior of the model is predicted by the parameter plane results. In particular we look at steady-state vectors for Markov chains.

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