Closed orbits in planar bimodal linear systems

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It is well known that algebraic invariants lead to the topological and differentiable typology of planar linear systems. However, these systems cannot model complex dynamics such as hyperbolic orbits or homoclinic orbits. Here we show that they do appear in planar bimodal linear systems and that their typology is again determined by the algebraic invariants of both subsystems.

Appearance of both kinds of singularities in case 3: \( a_1 = 0, a_2 = 1, b_1 = 0, b_2 = -5, \) and \( b_3 = 1. \)

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