Global dynamics for planar vector fields with a star node and homogeneous nonlinearities

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We study the global dynamics of vector fields of the form $u_0 = \lambda u + Q(u)$, where $\lambda > 0$ and $Q(u)$ is a planar homogeneous polynomial vector field. We discuss the number and stability of equilibrium points, both in the plane and in the circle at infinity in the Poicaré compactification. We obtain conditions for the existence of a globally attracting poly-cycle, thus extending previous results on the existence of limit cycles. A more detailed analysis is done for symmetric vector fields.