

Location of limit cycles and bounds for bifurcation values

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In many examples of planar differential systems, one numerically knows the existence of a hyperbolic limit cycle. With this information, can one analytically prove the existence of such limit cycle? In this talk we propose a method to do so by constructing Poincaré rings. We illustrate it with several applications, including quadratic vector fields and piecewise linear systems with two zones. We also apply our techniques to one-parameter families of vector fields and, thus, we can bound the bifurcation value. In 1996, Odani gave a bound of the sky-blue bifurcation value of the Liénard system of degree 5 (aka. Rychkov system). We can improve this bound.