Effect of forcing , damping and detuning on Van der Pol equation

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The Van der Pol equation is one of the distinguished non-linear oscillator. There are papers concerning the effect of damping on the equation. But the new contribution that we make to this study is the use of geometric methods to understand the bifurcations of the multi-parameter families of The Melnikov function that arise. We use the Melnikov function together with geometric method of bifurcation theory to study the interactions of damping, forcing and detuning on the resonant periodic orbits for the Van der Pol equation. In fact the techniques fall in to the general framework of multi-parameter bifurcation from a manifold as described in [3].
The method which presumably goes back at least to Poincare, is to consider the perturbation as depending on single parameter which in our case is two parameters . As we know the Van der Pol equation has a periodic orbit wich we called γ. In this talk we extended the work of Chicone in a series of papers [1,2] for two parameters perturbations on the equation. We try to answer the question arise : if there is more than one independent perturbation parameter, is the periodic orbit γ persist under the two parametric perturbation? The answer is yes for some initial values. We give this initial values by looking at the bifurcation matrix which has Kernel of dimension at least 1.

References

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