

## UNIQUENESS OF RELAXATION OSCILLATIONS

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### Abstract

A recent paper in the Siam Journal of Applied Dynamical Systems discusses a relaxation oscillator which apparently cannot be put in standard Lienard form. The authors use three rescaling regimes, geometric perturbation theory, and a "blow-up" method to analyze this model. (The blow-up method replaces the more traditional use of matched asymptotic expansions.) Their main result is the existence, uniqueness, and asymptotic orbital stability of a periodic solution for small values of two parameters and the behavior of this solution as these parameters tend to zero in an appropriate way. We show how standard ode methods can be used to prove these results with much less effort. Uniqueness is the main challenge. Our proof is much shorter than its predecessor, and we believe that it is also simple, straightforward, and easy to understand. For uniqueness and asymptotic orbital stability we need only one parameter to be "small", no rescaling, blow-up, or expansions are required and we cover a general class of equations.