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Vincent DM NAUDOT* (vnaudot@fau.edu), 777 Glades Road, Department of Mathematical Sciences, Boca Raton, FL 33431, **Shane Kepley** (sk2011@math.rutgers.edu), The State University of New Jersey, New Brunswick, NJ , and **William D Kalies** (wklaies@fau.edu), 77 Glades Road, Dept of Mathematical Sciences, Boca Raton, FL 33431. *Complexity in A Hybrid Van der Pol system.*

In this work we study, from a numerical point of view, the dynamics of a specific hybrid map which is that of the kicked Van der Pol system. The dynamics of this system is generated by a two stage procedure: the first stage is the time τ -map of the vector field associated with the Van der Pol equation, the second stage is a translation. We propose a numerical method for computing invariant manifolds of a given fixed point, which leads to high order polynomial parameterization of the embedding. Such a representation of the dynamics on the manifold is obtained in terms of a simple conjugacy relation and by constructing two contracting operators. We illustrate our techniques by plotting (for specific value of the parameters) the invariant manifolds displaying homoclinic intersection. Furthermore our numerical study reveals the presence of a strange attractor included in the closure of the unstable manifold of the fixed point. (Received January 12, 2021)