On the existence of periodic orbits and chaotic dynamics

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We present two theorems on the existence of periodic solutions of autonomous differential equations inside isolating blocks. The first theorem was published in [1], where a combinatorial approach to the problem, based on a suitable decomposition of the phase space, was proposed. The second theorem is motivated by a corresponding result on time-periodic non-autonomous system given in [2]. It is illustrated by a proof of the existence of chaotic dynamics in systems imitating the behavior of the Lorenz system at some range of parameter values.

References

[1] M. Mrozek, R. Srzednicki, J. Thorpe, T. Wanner, *Combinatorial vs. classical dynamics: Recurrence*, Comm. Nonlin. Sc. Numerical Simulation **108** (2022) 106226, 1-30.

[2] R. Srzednicki, *On periodic solutions inside isolating chains*, J. Differential Equations **165** (2000), 42-60.