ON A CONJECTURE FOR THREE–DIMENSIONAL COMPETITIVE LOTKA–VOLterra SYSTEMS WITH A HETEROCLINIC CYCLE

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Abstract. For three-dimensional competitive Lotka-Volterra systems, Zeeman (1993) identified 33 stable equivalence classes. In this paper we show that: in the case of a heteroclinic cycle on the boundary of the carrying simplex of three-dimensional competitive Lotka-Volterra systems (class 27 in Zeeman’s classification), the conditions (a) there is a pair of purely imaginary eigenvalues at an interior equilibrium, (b) the first focal value vanishes, \( (c') \) the second focal value vanishes, and (c) the heteroclinic cycle is neutrally stable do not imply (d) the third focal value vanishes. In particular, the conditions (a), (b), \( (c') \), and (c) do not imply that the interior equilibrium is a center. This proves a conjecture by Gyllenberg and Yan (2009).


Keywords and phrases: competitive Lotka-Volterra system, limit cycles, carrying simplex, heteroclinic cycle.

REFERENCES

