

Quadratic three-dimensional differential systems having invariant planes with total multiplicity nine

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Abstract In this paper we consider all the quadratic polynomial differential systems in $\mathbb{R}^3$ having exactly nine invariant planes taking into account their multiplicities. This is the maximum number of invariant planes that these kind of systems can have, without taking into account the infinite plane. We prove that there exist thirty possible configurations for these invariant planes, and we study the realization and the existence of first integrals for each one of these configurations. We show that at least twenty three of these configurations are realizable and provide explicit examples for each one of them.

Keywords Polynomial differential systems · Invariant planes · First integrals · Extactic polynomial

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