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Summary: In this paper, a symbolic, algorithmic procedure to compute an immersion that recasts a polynomial system into a linear one up to an output injection is proposed. Such a technique is based on computing, through algebraic geometry methods, the set of all the embeddings of the system and on matching the coefficients of these polynomials with the ones of the embeddings of a linear system up to an output injection. The given algorithm is then relaxed to compute an immersion that recasts a polynomial system into a form that is linear up to a finite order and an output injection and to compute an approximation of the immersion.

MSC:
93C10  Nonlinear systems in control theory
13P05  Polynomials, factorization in commutative rings
68W30  Symbolic computation and algebraic computation
93B07  Observability
93B18  Linearizations

Keywords:
observer design; linear systems up to an output injection; embeddings; algebraic geometry

Software:
Mathematica; PHCpack; NumericSolutions; ISOLATE; Macaulay2

Full Text: DOI

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