

Workshop on "Geometry of vector distributions, differential equations, and variational problems"

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Abstracts of the posters

Generalized triangular forms: coordinate-free description and backstepping

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We investigate a new class of nonlinear control systems of O.D.E. which are not feedback linearizable in general. Our class is a generalization of the well-known feedback linearizable systems, and moreover it is a generalization of the triangular (or pure-feedback) forms studied before. We describe our "generalized triangular form" in coordinate-free terms of certain nested integrable distributions. Therefore, the problem of the feedback equivalence of a system to our generalized triangular form is solved in the whole state space by the definition of our class. We apply a specific backstepping procedure, and solve the problem of global controllability for our class. Our "backstepping algorithm", in turn, is based on the construction a certain discontinuous feedback law.

We propose to treat our class as a new canonical form which is a nonlinear global analog of the Brunovsky canonical form on the one hand, and is a global and coordinate-free generalization of the triangular form on the other hand.