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pour la dynamique en grande dimension
« Atelier sur la dynamique de calcul rigoureuse dans des dimensions infinies »
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Validated integration of variational equations

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Algorithms for validated integration of variational equations [1,2] proved to be a powerful tool in quantitative analysis of finite dimensional dynamical systems, including validated continuation of periodic and connecting orbits, validation of hyperbolicity of invariant sets. To the best of our knowledge, there appeared only one algorithm of this type [3], which applies to a class of infinite-dimensional dissipative systems.

We propose a new algorithm for rigorous integration of variational equations for dissipative systems. Sensitivities with respect to selected finite set of variables are computed explicitly, while dissipative variables are controlled via logarithmic norms.

Results of preliminary numerical experiments will be also presented.

[1] P. Zgliczyński, C^1-Lohner algorithm, Foundations of Computational Mathematics, (2002) 2:429-465

[2] I. Walawska and D. Wilczak, An implicit algorithm for validated enclosures of the solutions to variational equations for ODEs, Applied Mathematics and Computation, Vol. 291C, 303-322 (2016).

[3] G. Arioli and H. Koch, Integration of Dissipative Partial Differential Equations: A Case Study, SIAM J. Appl. Dyn. Syst., 9(3), 1119–1133.

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