

PLAN DE RECHERCHE - Page de couverture RESEARCH PLAN - Cover Page

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Titre provisoire de la thèse <i>Provisional title of the thesis</i>	Probabilistic methods for uncertainty quantification of the error in numerical solvers of differential equations
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Résumé / Abstract *

A large variety of numerical methods for ordinary and partial differential equations have been proposed in the last decades, with an emphasis on the analysis of the numerical error in terms of accuracy and stability. However, traditional deterministic methods fail to furnish reliable solutions in a wide range of problems, especially when the employed discretisation is not sufficiently refined. In particular, classical error estimators can be overconfident on the method's precision, possibly leading to inadequate results in frameworks such as statistical inference of parameterised models. In this work, we propose novel probabilistic numerical methods which allow to overcome these issues. In particular, we are able to perform a full uncertainty quantification of numerical errors by introducing a probability measure over the approximate solution. In this way, we can provide with quantitative criteria on the reliability of the numerical method. Moreover, consistency with the deterministic approach is granted via precise estimates on the variability of the resulting probability measure, which scales according to the precision of the numerical solver.

*Résumé et plan de recherche lus et approuvés / *Abstract and research plan read and approved

Candidat <i>Candidate</i>	Directeur de thèse <i>Thesis director</i>	Codirecteur de thèse <i>Thesis co-director</i>	Dir. de programme <i>Doctoral program dir.</i>
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