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A Short Tour of Computational Science and Mathematics

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Computational science and mathematics have taken on an increasingly larger role in scientific research. In fact, together they are now recognized as the third pillar of science along with theory and experimentation. This new role is in part a result of an increased use of computer modeling and simulation of physical processes due to the tremendous growth in computational power. More importantly, this new role is a direct result of a better understanding of the underlying mathematics and the development of improved algorithms. Indeed, examples from wide ranging fields such as nanoscience, biology, climate modeling and astrophysics point not only to the role that computer science and mathematics play in modeling physical processes but in understanding and predicting new phenomena. In this talk, I will present a short tour of several areas where computational science and mathematics have had a profound impact on science and suggest new areas for research in the future.