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Computational Mathematics Seminar Series

Structure-preserving finite-element schemes for the Euler-Poisson equations**Matthias Maier, Texas A&M University**

Associate Professor

Digital Media Center 1034
April 25, 2023 - 03:30 pm**Abstract:**

We discuss structure-preserving numerical discretizations for the repulsive and attractive Euler-Poisson equations. The scheme is fully discrete and structure preserving in the sense that it maintains a discrete energy law, as well as hyperbolic invariant domain properties, such as positivity of the density and a minimum principle of the specific entropy.

We discuss the underlying algebraic discretization technique based on collocation and convex limiting that maintain hyperbolic invariants and a discrete energy law, and discuss recovery strategies to maintain the discrete Gauss law.

Speaker's Bio:

Matthias Maier is an Associate Professor in the Department of Mathematics at Texas A&M University. His research centers around scientific computation and analysis of numerical methods for optics and fluid dynamics with an emphasis on simulating multiscale phenomena. He is a principal developer of the finite element software deal.II.

Matthias Maier has master's degrees (Diplomen) in both Mathematics and Physics from Heidelberg University (Germany). He earned a doctorate in mathematics from Heidelberg University in 2015, and was a Dunham Jackson Assistant Professor at the University of Minnesota (Twin Cities) from 2015 to 2018. He joined the Texas A&M faculty in 2018, and was promoted to Associate Professor in 2022.

