Resonances as a computational tool
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Linear problems and smooth solutions are nowadays well understood, a reliable description of 'non-smooth' phenomena remains one of the most challenging open problems in computational mathematics. Nevertheless, 'non-smooth phenomena' play a fundamental role in modern physical modeling (e.g., blow-up phenomena, turbulences, high frequencies, low dispersion limits, etc.) which makes it an essential task to find suitable numerical schemes. In this talk I present a new class of low regularity integrators. The key idea in the construction of the new schemes lies in embedding the underlying oscillatory structure of the PDE into the numerical discretisation, addressing the fundamental question: How and to what extent can we reproduce the qualitative behavior of partial differential equations in a finite (discretized) world?