WORKING GROUPS PDE

DATE: WEDNESDAY, JULY 20, STARTING FROM 15:00[1]

A presentation of the paper "Superconvergent functional estimates from summation-by-parts finite difference discretizations" by J. E. Hicken and D. W. Zingg

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We will discuss the paper by J. E. Hicken and D. W. Zingg, where they show that diagonal-norm summation-by-parts operators can be used to construct time-stable high-order accurate finite-difference schemes. Even if the boundary closure limits the solution to (s+1)-order when the interior scheme is 2s-order, SBP operators can be used to obtain 2s-order accurate functional estimates. We will develop the theory for scalar hyperbolic and elliptic PDEs in one dimension and and generalize to higher dimensions.

An introduction to statistical inversion theory

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Inverse problems are those problems in which we try to find some data using some a posteriori obtained measurements. These problems can be often modeled as equations, or finding inverse functions. Sometimes (and in real life, always) the measurements will have some perturbations, that can make the solutions of the problem non precise or even impossible to find. Classical regularization methods can help us to find an approximate solution.

But sometimes that kind of approximate solutions are not good enough for our purposes. Those methods treat the perturbations as deterministic, when the most realistic approach would think of them as random variables, i.e. they would be an stochastic noise. This consideration is enough to change all of the nature of the problem, and motivates the study and utilization of a different way of dealing with it: the statistical inversion methods.

If we consider that classical inverse problems the purpose is to consider the data to be found (called unknown) as a fixed value depending on the measurements, the statistical approach to the same problem will treat the unknown as a random variable whose distribution depends on the value that the measurement takes.

A presentation of the paper "Discontinuous Galerkin methode for the Helmholtz equation with large wave number" by Xiaobing Feng and Haijun Wu

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TBA

[1]Each presentation will last 30 minutes with some break in between for further questions and discussions