Computation of the Adjoint Navier-Stokes Equations using the Discontinuous Galerkin Method

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Kernel based interpolation is THE tool for multidimensional scattered data interpolations. However, it suffers from Schabacks uncertainty relation. In order to restrict this problem, researchers have come up with various approaches such as choosing different basis functions in the interpolation space or greedy methods. We, however, explore new ways to adapt the interpolation kernels themselves to the underlying problem.
The presentation is concerned with the construction of summation kernels. Where we distinguish between standard and anisotropic ones. The standard summation kernel is the standard sum of addend kernels all acting on the same set. Whereas we compose addend kernels acting on individual lower-dimensional spaces resulting in a high-dimensional kernel, in the anisotropic case. Due to the work of Aronszajn (1950), it is already known that the finite standard sum of positive semi-definite kernels is again positive semi-definite, and that the corresponding native space is the Minkowski sum of the addend native spaces.
We expand this known theory by intersection kernels and an infinite countable summation kernel. Furthermore, we prove an analogue behavior regarding the native space in the anisotropic case. The interpolation with these two summation kernels is analyzed and its benefits highlighted. Numerical examples illustrate the computational advantages of anisotropic summation kernels and their flexibility, since we can equip each subdomain of the initial domain with an individual addend kernel depending on the given application.