Quasi-interpolation: Approximating without Interpolating

Janin Jäger, Katholische Universität Eichstätt-Ingolstadt

The name quasi-interpolation is used for a large number and variety of methods. The first step in the talk will be to identify defining properties of quasi-interpolants and to differentiate them from interpolation methods. Then the foundations, which are the famous Strang-Fix properties and Schoenberg's work on splines, will be reviewed.

The mathematical analysis of quasi-interpolation will be investigated in three directions. First, we will discuss the choice of bases, possibilities are spline spaces, radial basis functions, and many others. As a second step, we will focus on different types of information available about the underlying function and the computation of the quasi-interpolant. This includes techniques based on point evaluations, averages, integrals and least squares-based methodologies. Finally, we will examine mathematical properties, including existence, locality, convergence, and precision. Emphasis will be on recent advances in the multivariate construction using kernel-based methods and scattered data.

The last part presents examples of applications, including data approximation, diagnostics and solution of PDEs.