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Construction of multivariate exponential smoothing operators and raising dimension technique for finding the fundamental solution of the associated PDE and smoothing kernel. (Chinese. English summary) [Zbl 1324.65021]

Summary: The aim of the paper is to give the analytic expression of $\delta$-smoothing, i.e. smoothing kernel, by multivariate exponential smoothing operators (MESO). From the definition of the MESO by us, the construction of smoothing kernel is led to find the fundamental solution of the associated partial differential equation (PDE), and its generalized difference. The analytic expression of the later is obtained by our “raising dimension technique”. The support of the smoothing kernel may be high dimensional parallelohedron, or simplex as well. Thus, as a consequence, the problems of analytic expression of exponential box, and simplex splines are all resolved by our united technique.

MSC:
65D10 Numerical smoothing, curve fitting
65D07 Numerical computation using splines
65M80 Fundamental solutions, Green’s function methods, etc. for initial value and initial-boundary value problems involving PDEs
41A35 Approximation by operators (in particular, by integral operators)
65N80 Fundamental solutions, Green’s function methods, etc. for boundary value problems involving PDEs

Keywords:
multivariate exponential smoothing operators; smoothing kernel; fundamental solution; raising dimension technique; E-box spline; E-simplex spline