Seminario Rubio de Francia

Conferencia

por

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Título:

Weakly singular Volterra integral equations of the second kind: properties of exact solutions, and approximate solution using collocation

Resumen: We describe the structure of exact solutions of weakly singular Volterra integral equations (VIEs) of the second kind, whose integral kernels have factors of the form $(t-s)^{-\alpha}$ for some constant $\alpha \in (0,1)$. Piecewise polynomial collocation (PPC) approximate solution of this class of problems has been extensively studied in the literature and sharp error estimates are well known. But if one sets formally $\alpha = 0$, these error estimates do not coincide with error estimates for PPC for VIEs with smooth kernels, and we correct this anomaly by a new analysis that improves the error bounds for $\alpha \in (0,1)$. Furthermore, we develop a general theory of PPC for variable-exponent weakly singular VIEs (i.e., $\alpha = \alpha(t) \in [0,1)$), including existence, uniqueness, and regularity theory for the exact solutions of these problems.

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