An hybrid collocation method for fractional terminal value problems

M. L. Morgado, M. Rebelo and N. J. Ford

Abstract: In this work we are concerned with the numerical approximation of terminal (or boundary) value problems for fractional differential equations. The approach used is based on the equivalence between this kind of problem and a Fredholm integral equation. Taking into account the potential non-smoothness of the solution of such problems at the origin, we propose a collocation method which combines a non-polynomial approximation on the first subinterval of the mesh followed by piecewise polynomial collocation on a graded mesh.
A convergence analysis is provided and some numerical results are presented and discussed.