On functionally-fitted Runge-Kutta methods

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Abstract: Functionally-fitted methods are generalizations of collocation techniques to integrate an equation exactly if its solution is a linear combination of a chosen set of basis functions. When these basis functions are chosen as the power functions, we recover classical algebraic collocation methods. This paper shows that functionally-fitted methods can be derived with less restrictive conditions than previously stated in the literature, and that other related results can be derived in a much more elegant way. The novelty in our approach is to fully retain the collocation framework without reverting back into derivations based on cumbersome Taylor series expansions. ?? Springer Science + Business Media B.V. 2006.
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