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Fast Runge-Kutta methods for nonlinear convolution systems of Volterra integral equations.

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Summary: In this paper fast implicit and explicit Runge-Kutta methods for systems of Volterra integral equations of Hammerstein type are constructed. The coefficients of the methods are expressed in terms of the values of the Laplace transform of the kernel. These methods have been suitably constructed in order to be implemented in an efficient way, thus leading to a very low computational cost both in time and in space. The order of convergence of the constructed methods is studied. The numerical experiments confirm the expected accuracy and computational cost. I suggest to compare this technique with Adomian decomposition method very suitable for integral equations.

Reviewer: Yves Cherruault (Paris)

MSC:

[65R20](#) Numerical methods for integral equations
[45D05](#) Volterra integral equations
[44A35](#) Convolution as an integral transform
[44A10](#) Laplace transform

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Volterra integral equations; Hammerstein equations; Runge-Kutta methods; fast numerical methods

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