

Expansion formulas for the Riemann-Liouville fractional operators

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Abstract

We obtain new decomposition formulas for the Riemann-Liouville fractional integral and fractional derivative, as a series involving derivatives of integer order only. The new formulas are valid for functions of class C^n , with $n \in \mathbb{N}$, and they allow us to develop suitable numerical approximations with known estimations for the error. The usefulness of the obtained results, in solving fractional integral and differential equations and fractional problems of the calculus of variations, is illustrated.

AMS Classification: 26A33, 33F05.