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# Analytical solution of fractional variable order differential equations<sup>☆</sup>

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## Abstract

The aim of this paper is to introduce an approach for solving fractional variable order linear differential equations. The approach is based on switching schemes that realize different types of variable order derivatives. Obtained analytical solutions are compared with numerical results. Achieved methods can be helpful, e.g., to validate existing or developed numerical algorithms for solving these types of equations.

*Keywords:* fractional derivatives and integrals, fractional differential equations, variable order

*2010 MSC:* 26A33, 34A08, -

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## 1. Introduction

Fractional calculus is a generalization of traditional integer order integration and differentiation on non-integer orders. This generalization assumes that the traditional integer order calculus is only a special case of fractional order differential calculus. The history of fractional order calculus is nearly as old as traditional differential calculus, because the first time when possibility of defining the fractional order derivative has been mentioned was in 1695 by Leibniz and L'Hôpital.

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