

# Lie symmetry analysis of time fractional differential equations

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(分数階微分方程式のリー環対称性による研究)

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### 論 文 内 容 の 要 旨

We study time fractional linear and nonlinear evolution systems with variable coefficients via Lie symmetry analysis. For both classes of the system, we give complete group classification and for linear time fractional evolutions systems, we give exact solutions corresponding to infinitesimal symmetries of optimal systems of Lie algebras generated by infinitesimal symmetries. For fractional nonlinear evolution system, we give explicit invariant solutions in some particular cases. The group invariant solutions are expressed in terms of special functions. More concretely, with the help of the infinitesimal symmetries we reduce the system of time fractional partial differential equations into a system of fractional ordinary differential equations which have Euler-type integer order differential operator up to second order. Even though finding exact solutions to fractional differential equations is not easy, we are able to give solutions to fractional differential equations with Euler-type integer order differential operator up to arbitrary high order.