

# Exponential integrators for fractional differential equations

Roberto Garrappa

*Department of Mathematics, University of Bari “A.Moro”,  
Via E.Orabona 4 - 70125 Bari - Italy*

`roberto.garrappa@uniba.it`

<http://www.dm.uniba.it/Members/garrappa>

Exponential integrators have been proven to be a class of effective methods for the numerical treatment of systems of differential equations of large size, especially in the presence of stiffness.

In particular, exponential integrators turn out to be suitable when applied to systems arising from the discretization, along the spatial variables, of partial differential equations.

In this talk we discuss some approaches to generalize exponential integrators to fractional-order problems. The main theoretical aspects are investigated; we also discuss in detail some computational issues such as the evaluation of the action on some vectors of Mittag-Leffler functions with matrix arguments: this challenging task plays a fundamental role in the derivation of exponential integrators for fractional-order problems and requires the development of well-suited techniques.