Asymptotic expansions of solutions to fractional diffusion equations

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Inhomogeneous fractional diffusion equation appears in the study of various nonlinear problems with anomalous diffusion, the Laplace equation with a dynamical boundary condition, and so on. Under suitable integrability conditions on the inhomogeneous term, the solution behaves like a suitable multiple of the fundamental solution to the linear fractional diffusion equation asymptotically with respect to time. In this talk we give the higher order asymptotic expansions (HOAE) of the large time behavior of the solution. Furthermore, we also give the precise description of the large time behavior of solutions to the Cauchy problem for nonlinear fractional diffusion equations. This talk is based on several joint works with Kazuhiro Ishige (Univ. of Tokyo).