A two-point boundary value problem with a Caputo fractional derivative

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In this talk we consider a fractional differential equation on the interval $[0, 1]$ whose leading term is a left Caputo fractional derivative of order α with $1 < \alpha < 2$. The choice of the boundary condition at $x = 0$ and the regularity of the solution is discussed. It is shown that the solution has a singular behaviour near $x = 0$ in general and it is taking into account in the analysis of the convergence of a finite difference scheme on a uniform mesh. Error estimates in the maximum norm are derived and the numerical results for some test problems are showed.

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