1056-35-807 **Sergei Fomin*** (sfomin@csuchico.edu), Khalifa University of Science, Technology and, Research (KUSTAR), P.O. Box 127788, Abu Dhabi, United Arab Emirates, and **Vladimir Chugunov** (chug@ksu.ru), Center of Information Technologies, Kazan State University, Kremlevskaya 18, Kazan, 420008, Russia. *Fractional differential equations for modeling anomalous diffusion in porous medium.*

Analysis of diffusion in a complex environment shows that the conventional diffusion equation based on Fick's law fails to model the anomalous character of the diffusive mass transport observed in the field and laboratory experiments. Two regimes of anomalous diffusion are identified. One regime, which is called sub-diffusion, is characterized by the slower propagation of the concentration front, so that the squared distance of the front passage requires longer time than in the case of the classical Fickian diffusion. The second regime (called super-diffusion) is characterized by the higher diffusion rate. Both regimes can be modeled by non-local diffusion equation with temporal and spatial fractional derivatives. In the present paper the examples of the equations that can be used for describing the anomalous mass transport are presented and some important properties of these equations are discussed. Analytical solutions of some particular problems of sub-diffusion and super-diffusion in the fractal media of various geometries are obtained by the method of Laplace transformations. Using the Mathematica 7 computer algebra system, the obtained solutions are illustrated graphically. (Received September 17, 2009)