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MODELLING OF THE COUPLED TRANSPORT PROCESSES THROUGH POROUS MEDIA AT PRESENCE OF ANOMALOUS DIFFUSION

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The mathematical modelling of various types of coupled transfer processes plays nowadays a role of continuously increasing importance for understanding problems related to global energetic supply and dynamics of energetic systems in order to make them sustainable. Such methods are based on principles of the contemporary non-equilibrium thermodynamics, and are continuously re-examined and improved. In the present study, we will demonstrate a novel-type solution of the problem of coupled heat-, and mass transfer processes taking place through porous media, since this basic-type transport problem has countless number of applications ranging from e.g. modelling and simulation of drying processes till fundamental research calculations in the extended irreversible thermodynamics. The crucial novelty in our modelling method is the following one: it will be assumed, that the heat transfer may be described - as earlier – by a simple extension of the initial Fourier-type partial differential equation, while in the case of the diffusion, instead of the earlier usually applied Fick-type equations, the generalized version of its, able to describe anomalous diffusion processes must be incorporated into the initial coupled system of the relevant partial differential equations. Finally, following an earlier our own modelling method, we have solved this coupled system of partial differential equations by the usually applied operational calculation methods and have incorporated the effect of the anomalous diffusion effects, too. It was assumed, that the manifestations of the concentration changes due to anomalous diffusion are of second-order magnitude, but even under this assumption they influenced the final solution form of the problem very significantly.

Keywords: *thermodynamics, anomalous diffusion, environmental transport processes*

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