Historical remark about the origin of the p-Laplacian in hydrogeology

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Abstract

As a model of the flow of an incompressible fluid through a porous medium, we derive a p-Laplacian equation. We combine the continuity equation and a nonlinear constitutive equation that binds the force with the flux. Development of such nonlinear constitutive equations goes back to the beginning of the 19th century in connection with the study of the groundwater flow. We mention the work of de Prony (1804) and his followers, Darcy, Forchheimer, Smreker, Kröber and others. This is a joint work with P. Girg, L. Kotrla and P. Takáč.