



## Comparison of Two Fractal and Empirical Models in Prediction of Unsaturated Hydraulic Conductivity

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Environmental conservation is one of the main objects of human societies and their governments. Contaminants produced by industrial companies are transferred into the soil, rivers and ground waters which have been caused enormous environmental problems. To solve this problem, it is necessary to investigate solute and water movements, pollution rate and measurements of soil properties like soil moisture curve and unsaturated hydraulic conductivity. Soil water retention curve is one of the most important characteristics in estimation of soil hydraulic properties like unsaturated hydraulic conductivity which its direct measurement is time consuming and expensive. Since, its measurement is unavoidable, soil physics scientist's effort has been focused on the indirect methods like pedotransfer functions and empirical relationships to estimate this characteristic easily. In this study, 20 soil samples with 9 soil textures from *UN-SODA* database (Leij et al., 1996) were used to compare a fractal model, Kravchenko and Zhang (1997), with an empirical model, van Genuchten (1980), for prediction unsaturated hydraulic conductivity. The parameters of two models were estimated from the directly fitted soil water retention data to the Tyler and Wheatcraft (1990) and van Genuchten (1980) models. The saturated hydraulic conductivity was collected from *UN-SODA* database. The values of relative standard error, *RSE*, and Akaike's information criterion, *AIC*, ranged from 0.08 to 9.11 and 116.8 to -143.6 for fractal model and from 0.15 to 3.74 and 171.7 to -167.3 for empirical model. Comparison of the statistical parameter values, *RSE* and *AIC*, showed that for 70% of the samples the

fractal model was able to predict the unsaturated hydraulic conductivity better than the empirical model.