

Interactive comment on “The referential grain size and effective porosity in the Kozeny–Carman model” by K. Urumović and K. Urumović Sr.

Anonymous Referee #1

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General comments: Determination of soils permeability on the basis of their grains size is definitely very interesting because it allows to predict the permeability from easily measured and routinely obtainable data. The article has a great value also because the investigations were carried out on a large number of samples. Although I do not agree with all conclusions I think that the article is worthy for publication.

Specific comments: The question is if Kozeny-Carman equation also applies to clays or sands with a larger amount of clay minerals. For example: the studies of Carman (1939) have shown that the KC equation is suitable for the evaluation of permeability for gravel and sand, whereas it is useless for clays. Such a conclusion was based on the studies of natural clays, which showed that the relationship between k and μ is not constant but decreasing function of porosity. Experimental investigations of Taylor (1948) have confirmed this claim, as well as measurements of fine grained natural

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materials, carried out by Michaels and Lin (1954). Al-Tabbaa and Wood (1987) have demonstrated that the coefficient of permeability for kaolinite is not linearly dependent on σ_v , which means that the KC equation does not apply. By the same conclusion also came Dolinar and Otoničar, 2007. They used pure clay minerals in their investigations. They concluded that KC equation is not suitable for clays in original form. They proposed a modified form of KC equation (Geologija, 2007, vol. 50, No. 2, str. 487-495). There is also the question how to properly measure the grain size of the fine-grained soils. With the use of hydrometer method, which is commonly used method for engineering purposes, the results are not precise enough. It is well known that very small amount of clay minerals have a great influence to the permeability of soils. I believe that the assessment of the permeability of cohesive soils is, in the manner suggested by the authors, less reliable, while it is very good for non-cohesive soils.

Technical corrections: Page 4, line 17: specific surface area based on the mass of solids M_s Page 4, line 31: . . . are effective porosity n_e (not n)

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