Improving the Carman-Kozeny equation

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**Project duration:** 6-9 months

**MSc track:** Water Management, Multiphase Systems  
**MSc specialisation:** multiphase flow; drinking water treatment; modelling  
**Research field:** Hydraulic modelling of liquid-solid fluidization in drinking water treatment processes

**Project:** Improved modelling of the Carman-Kozeny equation for drinking water hydraulic processes

The Carman-Kozeny equation is the most frequent used model in the field of water treatment processes to predict fluid dynamics such as bed porosity and pressure drop of a fluid flowing through a reactor packed bed of grains. For the derivation of this model several assumptions have been introduced. From a starting point of modelling the reactor bed is divided in a collection of curved passages or capillary tubes. The aim is to obtain new insights and therefore substantial more knowledge regarding the hydraulics of drinking water treatment processes (liquid-solid fluidisation) through the synthesis of more accurate prediction models.

**Experimental description:**

Experiments can be carried out at the pilot plant facility at Waternet (Weesperkarspel production plant) in Amsterdam. A novel fluidisation and filtration pilot set-up exists in particular for this research project. The aim is to obtain new insights and therefore substantial more knowledge regarding the hydraulics of drinking water treatment processes (e.g. liquid-solid fluidisation) through the synthesis of more accurate prediction models.

**Requirements:**

The assignment focusses on investigating existing novel techniques and methods regarding detecting particle dimension of drinking water grains. Ingredients of a successful project is a combination of practical and theoretical skills.