



Investigation of retention and transfer properties of green roofs: the Green Wave of Champs-sur-Marne (France)

Filip Stanic (1,2), Pierre Delage (1), Yu-Jun Cui (1), Pierre-Antoine Versini (2), Ioulia Tchiguirinskaia (2), and Daniel Schertzer (2)

(1) Ecole des Ponts ParisTech, Navier, Champs-sur-Marne, France, (2) Ecole des Ponts ParisTech, HMCo, Champs-sur-Marne, France

One of the main performances of green roofs is to reduce and/or delay urban runoff during the strong rainfall events. The substrate retention capacity and transfer properties is often described by the water retention and hydraulic conductivity curves. This work presents comparison between measured and different theoretical characteristics curves, as well as determination of more reliable fractal based substrate model.

Firstly, samples of organic volcanic substrate from wavy-form green roof of Champs-sur-Marne (France), called the Green Wave, were taken for detailed laboratory investigation. In order to simultaneously determine water retention and hydraulic conductivity curves of this unconventional substrate, special device based on tensiometry and axis translation technique has been designed (Stanic et al, 2018). Then different (semi-)empirical and fractal based theoretical curves were compared with results obtained in laboratory in order to determine the model that realistically describes green roof substrate's characteristics curves. Models based on (multi-)fractal theory are proved to be able to describe characteristics curves by calibrating several physically based parameters. It was shown that these models are able to fit better with water retention and hydraulic conductivity curves of the green roof substrate than the common (semi-)empirical models.

At the end we discuss why this kind of approach is very helpful for giving insight into the accuracy of theoretical curves in general, regarding both substrate characteristics curves. Also it gives an idea about the most realistic theoretical model, which is a very useful indicator for users and developers of rainfall-runoff models in wider context. Indeed, taking into account the most accurate option to describe substrate characteristics curves will result in more reliable runoff estimations.