

Zofia ZIĘBA, Kinga WITEK, Jakub MOŃKA

Institute of Building Engineering, Wrocław University of Environmental and Life Sciences

Effect of micro and nanosilica on the soil permeability coefficient under cyclic freezing and thawing conditions

Abstract

The paper presents the analysis of the permeability coefficient of frost-susceptible soil with microsilica (MS) and nanosilica (NS) addition. Tests were performed in a triaxial apparatus in three variants: on soil samples, on soil samples with a 5% MS and on samples of soil with a 5% NS addition. Because of the frost-susceptible properties of analysed soil, the permeability coefficient was determined on not frozen samples and on samples after 10 cycles of freezing and thawing.

The preliminary research results demonstrated that both microsilica and nanosilica have beneficial properties related to subsoil sealing. These properties are considerably stronger for nanosilica. Also, in all cases, the coefficient of permeability increased after 10 cycles of freezing and thawing, but the change trend remained the same. Nanosilica shows particularly good sealing properties of frost-susceptible soils. This confirms that it may be applied as a separate additive, which is not commonly used in engineering practice. Nano additives are usually used to extend the scope of micro additives influence.

In order to recognise the beneficial influence of analysed additives on soil permeability, the recognition of the changes in microstructure is necessary.