

Exploring the Relationship between the Kinetic Energy and Intensity of Rainfall in Sangju, Korea

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Abstract

The impact of raindrops on the soil surface causes soil detachment, which may be estimated by measuring the kinetic energy (KE) of the raindrops. Since direct measurements of rainfall force on ground surfaces are not generally available, empirical equations are an alternative option to estimate KE from rainfall intensity (I), which has the greatest influence over soil erosion and is easily accessible.

Establishing the optimal formulation for the relationship between kinetic energy and rainfall intensity has proven to be difficult. Thus, this research considered thirty-seven rainfall events observed from June 2020 to December 2021 using a laser optical disdrometer erected in Kyungpook National University to examine the characteristics of KE-I relationships. We concentrated our discussion on the formation of two different expressions of the KE, including KE expenditure (KE_{exp}) and KE content (KE_{con}).

The following conclusions were drawn: (1) We employed statistical analysis to demonstrate that the KE_{exp} is more suitable expression for establishing an empirical rule between KE and I than the KE_{con} . (2) A power-law model was used to find the best correlation between KE_{exp} -I relationship, whereas the best match between KE_{con} and I were found using an exponential equation.

Keywords : Rainfall kinetic energy, disdrometer, Korea

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