

## Energy-based analysis of permanent strain behaviour of cohesive soil under cyclic loading

Wojciech SAS<sup>1</sup>, Andrzej GŁUCHOWSKI<sup>1,✉</sup>, Bartłomiej BURSA<sup>2</sup>,  
and Alojzy SZYMAŃSKI<sup>2</sup>

<sup>1</sup>Water Centre Laboratory, Faculty of Civil and Environmental Engineering,  
Warsaw University of Life Sciences – SGGW, Warsaw, Poland

<sup>2</sup>Department of Geotechnical Engineering, Faculty of Civil and Environmental  
Engineering, Warsaw University of Life Sciences – SGGW, Warsaw, Poland

✉ andrzej\_gluchowski@sggw.pl

### Abstract

In this paper the original results of uniaxial cyclic compression test on cohesive soil are presented. The shakedown phenomena in cohesive soil are described. Energy-based method highlights the change of soil material behaviour from plastic shakedown through plastic creep shakedown to incremental collapse. The samples were cyclically loaded under undrained conditions with the constant amplitude of stress in one-way test procedure. In this study the energy-based method was presented as a proper method to categorise response of cohesive soil to cyclic loading in uniaxial conditions. A shakedown criterion factor,  $S_E$ , was introduced to help understand the shakedown phenomena in cohesive soil. In cohesive soils the absence of a limit between plastic shakedown and plastic creep shakedown was pointed out.

**Key words:** cohesive soil, shakedown, energy, cyclic loading, uniaxial compression, soil mechanics.

Full text is available at

<https://link.springer.com/article/10.1007/s11600-017-0028-7>