Discussion of
"Analysis of Nonlinear Soil Behavior under Vertically Loaded Steel Plate Considering Local Shear Failure of Soil"
by Qunli Chen, Ting Xu and Koji Tominaga

Hideaki Tanahashi
Professor, Department of Environmental Design,
Kyoto Prefectural University, Japan

The authors created a hybrid analysis model with nonlinear discrete springs on an elastic half space in order to evaluate the nonlinear bearing behavior of soils. It is appreciated that their simulations realized the nonlinear behaviors to some extent. However, the discussor would like to discuss the following points in order to understand the research results more clearly.

-Discussing point- 1
In the Introduction, some critical reviews were made concerning the behavior of vertically loaded plates on soils. As examples of literatures on an elastic behavior, two papers by Takahashi (2000) and also referred (the spelling of the author’s name are not correct both here and in the References). The referred papers 2) and 3) indeed deal with only the elastic behavior, however, the discussor insists that they deal with elastic surface settlements of an elastic layer with a finite depth being subjected directly to vertical loads and they never treat any behavior of a vertically loaded plate on soils. The main purpose of the referred papers is to propose a closed-form approximate formulation of surface displacements of an elastic layer with a finite depth using the Pasternak model. Additionally, the non-dimensional characteristic values are recommended, which are necessary to calculate surface displacements for practical use, for example, preliminary analyses, order checking, prediction of differential settlements and so on. The discussor, therefore, has some anxiety that the authors’ description may lead readers to misunderstand the contents of these references. Of course, the discussor recently extended his research to a rigid foundation on an elastic layer with a finite depth using the Pasternak model in the two-dimensional plane strain condition (Tanahashi 2001), which will have some relation to the present paper. However, the situation of the referred papers is supposed to have little relation to the authors’ studies. The discussor would expect some explanations.

-Discussing point- 2
Concerning the reference 6), the content of the referred pages (pages 276-278) is a description on pile behaviors being subjected to horizontal loads, which, as a discussor’s understanding, is little relation to the present paper. The reason or reviewed results of the reference 6) is expected to be given.

-Discussing point- 3
The case studies really show the improvements of the soil behaviors of some previous cases. How about are the other cases which were shown in the authors’ previous papers? If some comments on improvements of such cases are presented, the effectiveness of the proposed analysis becomes more significant. Otherwise, it may be difficult to yield a general conclusion clearly.

-Discussing point- 4
Concerning the two cases (Test 4 and Test 104) in total three circular plate test cases, \( q \) in Table 1 of the present paper are a little different from those in the previous paper (2002), which may be a small problem. The discussor supposes the values \( q \) are the results of soil investigations and the same between the present analysis and the previous one.

-Discussing point- 5
According to equation (1), \( \delta \) becomes infinity in case of \( a_{ii} \), because the distance \( \zeta_{ii} \) equals zero. \( \delta \) must be a finite value as a displacement of the sector or section including the evaluation point. The procedure how to deal with them should be explained.

-Discussing point- 6
According to the description of the analysis model, all sectors are divided into an equal area radially for a circular plate. However, the sectors drawn in Fig.2-a) look like to have different areas. The discussor would like to confirm that the areas of sectors and sectors are all the same. Additionally, it will be very useful for readers to reproduce or verify the present work by their own analysis based on the same cases if the actual numbers of \( n \) and \( m \) are recommended from the authors' case studies.

Contact Discusser
Hideaki Tanahashi, Department of Environmental Design, Kyoto Prefectural University, 1-5, Hangi-cho, Simogamo, Sakyo-ku, Kyoto, 606-8522, Japan
Tel: +81-75-703-5428, Fax: +81-75-703-5428
e-mail: tanai@kpu.ac.jp
(The publisher will insert here: received, accepted)

Reference