

## Earth pressure due to plane strain surcharge loads\*

by

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### Author's Reply

The authors thank Sri R. Nagamanikkam for his interest in their paper. Following are their replies to the observations made by him.

Formulae for the lateral stresses in soils due to Boussinesq's elastic theory are already available. By suitable integration of these basic expressions, authors have herein evaluated the magnitude of total earth pressure (force) and the moments of these forces about the base of the retaining walls and these results are presented in non-dimensional graphical form in Figures 3, 6 and 7 for ready use by design engineers.

The modification of elastic solutions to plastic equilibrium (active) conditions have been suggested in the numerical example included in the paper. For flexible retaining walls instead of Spangler's modified equation (3), one can straightaway use Boussinesq's equation 2.

The discussor's contention is that for the problem under discussion Westergaard's theory may be more appropriate than Boussinesq's Theory. Authors are trying to extend the Boussinesq solutions to three-dimensional problems (eg. lateral earth pressures under surcharge loads distributed over square, rectangular and circular areas) and also compare all these solutions with the corresponding solutions using Westergaard's Theory. However, preliminary calculations using Westergaard's Theory for the numerical problem (Figure 8) chosen in the paper indicate that the value of lateral earth force ( $P$ ) for a Poisson's ratio ( $\nu$ ) of 0.25 is of the order of 2.4 t/m. This is in comparison to Boussinesq's value of 2.2 t/m (for  $\nu = 0.5$ ) and Spangler's value of 4.6 t/m. However the active earth pressure ( $P_a$ ) values for the corresponding problem are 1.5 t/m from Boussinesq's Theory, 1.6 t/m from Westergaard's Theory and 1.5 t/m from Indian Rly Code (1963). All these values are almost the same and are nearly half the value of 3.1 t/m estimated from Spangler's method.

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\* Published in Indian Geotechnical Journal, Vol. 9, No. 4, October 1979.

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