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SOIL-STRUCTURE INTERACTION: CRITICAL LOADS ON FLEXIBLE CONDUITS BURIED AT SHALLOW DEPTHS

A. Skandarajah
Dept. of Civil Engineering, University of Peradeniya

Several empirical, theoretical and rational methods have been derived to analyse the failure modes of flexible conduits and their load carrying capacities[1]. Most of the theories deal only with uniformly applied boundary pressures on circular cross sections. But in real situations where a pipe is buried at shallow cover depths under highways, railways or airfields, it experiences non-uniform pressure due to the concentrated axle loads, which may also act eccentrically to the pipes.

This paper reports on the results of a model study investigating the deformation behaviour, failure patterns and induced stresses of flexible circular pipes buried at shallow cover depths in granular material. The variables were

the cover depth, the diameter, the bedding (flexible and rigid) and the load application. Concentric and ecentric loads were applied at the surface in order to determine the critical conditions.

The eccentric loading caused assymetrical buckling. When the pipes were buried at cover depths greater than the pipe diameter, the influence of eccentric loading was found to be negligible. For shallow covers (less than one diameter), the eccentrical critical loadings were smaller than those for the concentrical loading[2]. A finite element analysis was also carried out to analyse the soil-conduit behaviour for various conditions.

References

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