

# RELATIONSHIP BETWEEN MONOTONIC AND CYCLIC TRIAXIAL TESTS ON SETTLEMENT BEHAVIOUR OF FULL-SCALE RAILWAY BALLAST

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**BACKGROUND:** Monotonic and cyclic triaxial tests are widely used to investigate the settlement behaviour of railway ballast. However, understanding of the relationship between these two testing methods remains limited.

## MATERIAL AND METHOD



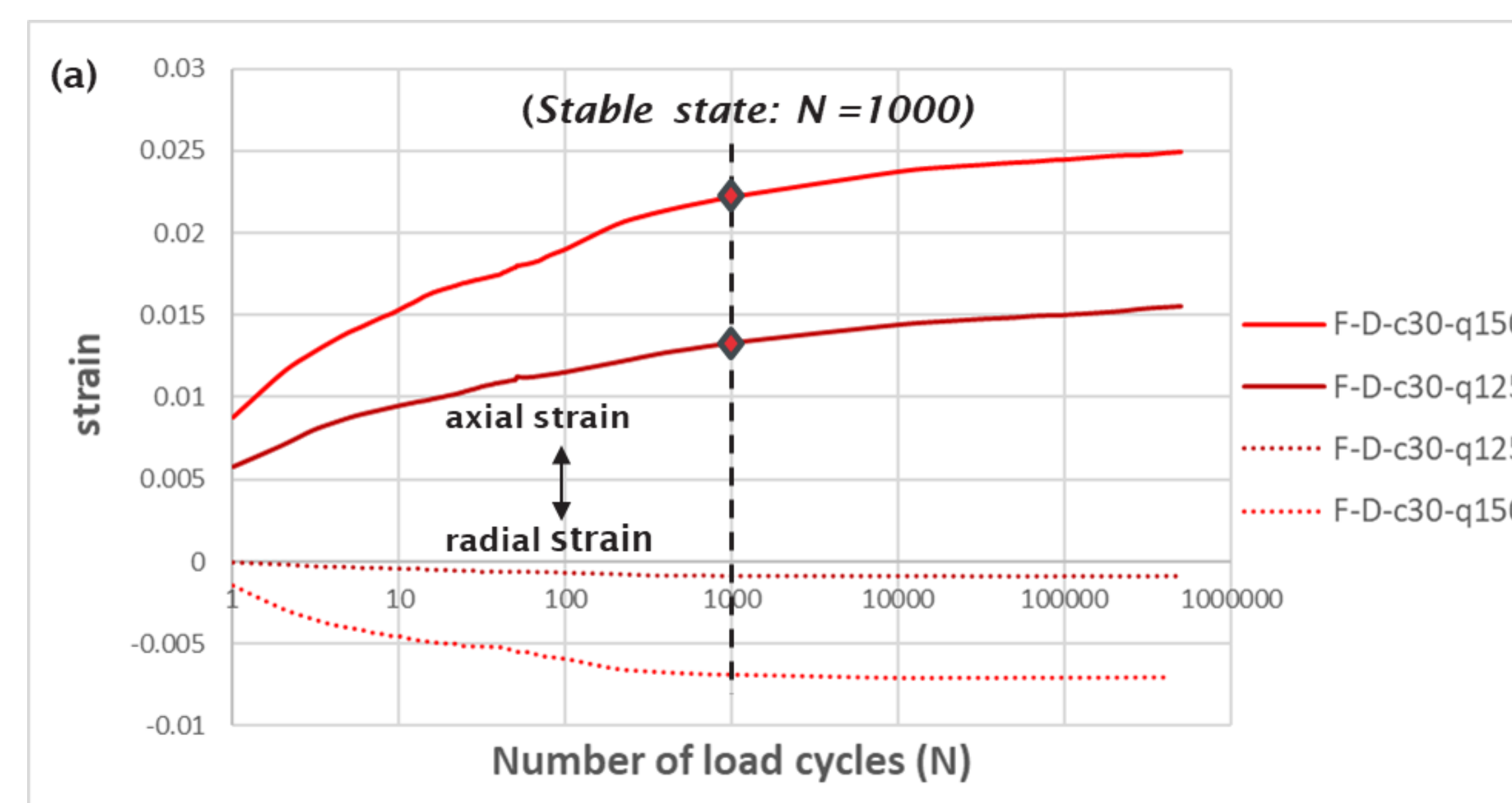
(a) Triaxial Setup (b) Full-scale Montsorrel ballast

- Sample size: height = 600 mm & diameter = 300 mm.
- Cell pressure: 30 kPa.
- Loading frequency: 3 Hz.

## CONCLUSION

- When the sample is subjected to cyclic triaxial loading and reaches a stable state, the resulting axial deformation resembles that which would be produced by monotonic loading of the same sample under the same  $q/p'$  and the same cell pressure.
- The peak deviatoric stress that leads to failure of a sample under monotonic loading is the same as the maximum deviatoric stress ( $q_{max}$ ) that causes failure on a sample subjected to cyclic loading under similar conditions.

## RESULTS



(a) Graphs of strain (axial and radial) against number of load cycles for fresh (F) and dense (D) samples under different deviatoric stress ( $q_{max}$ ).

(b)  $q/p'$  against shear strain for monotonic test (M) and different cyclic tests (C) at stable state.

(c) Graph of radial strain (RS)/volumetric strain (VS) against shear strain for Monotonic test (M) and Cyclic tests (C) at stable state.

