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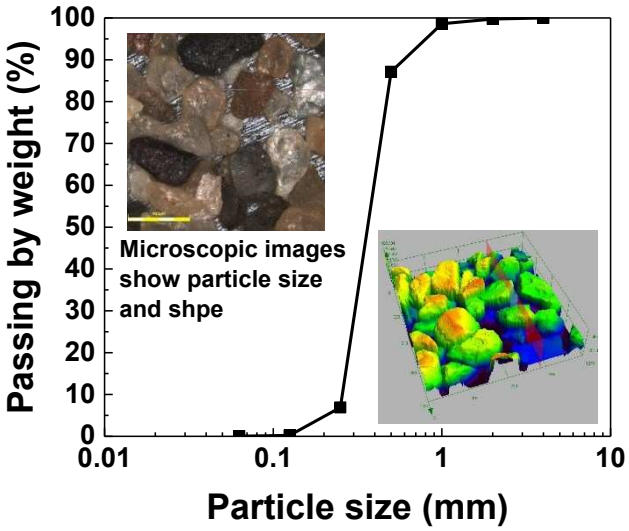
Local and global granular mechanical characteristics of grain-structure interactions

Z.K. Jahanger[1,2], J. Sujatha[3]and S.J. Antony[1*]

[1]School of Chemical and Process Engineering, University of Leeds, LS2 9JT, UK, Email: ml13zkj@leeds.ac.uk
[2] Department of Water Resources Eng., College of Engineering, University of Baghdad, Al-Jadriya Campus, Baghdad, Iraq, Email: zuhairkadhim@gmail.com

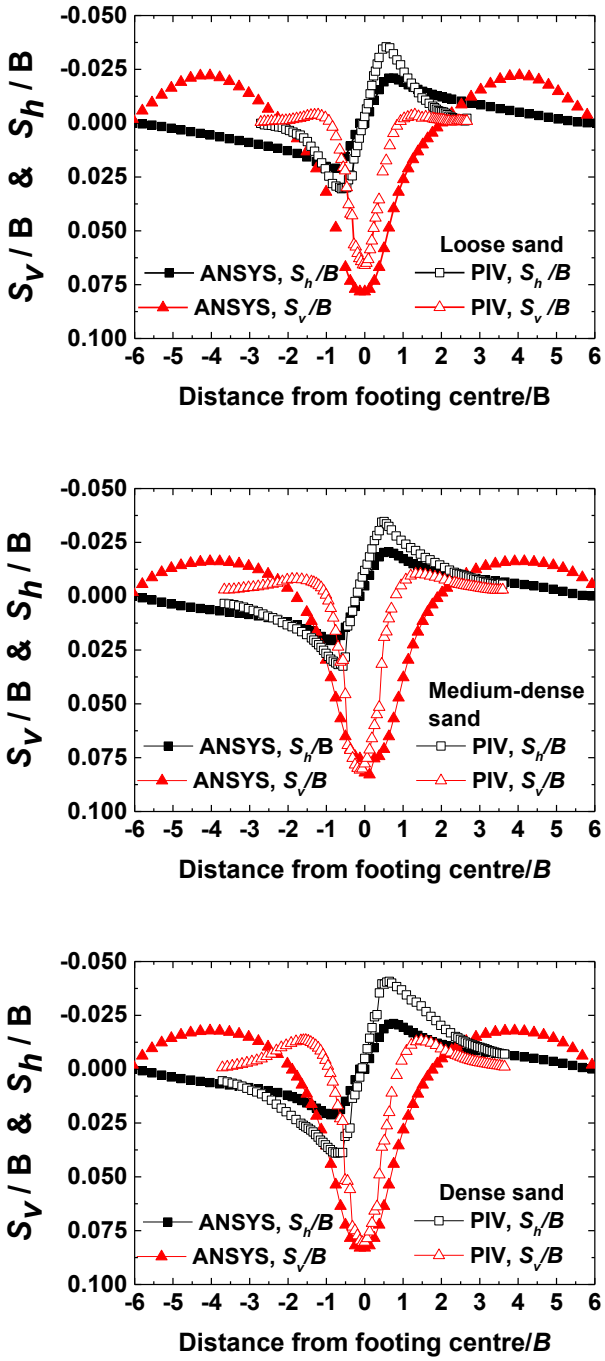
[3]Department of Civil Engineering, University College of Engineering, Nagercoil, India, Email: judessuja@yahoo.com

* Corresponding author: Email: S.J.Antony@leeds.ac.uk, Ph.: 00441133432409, Fax: 00441133432405

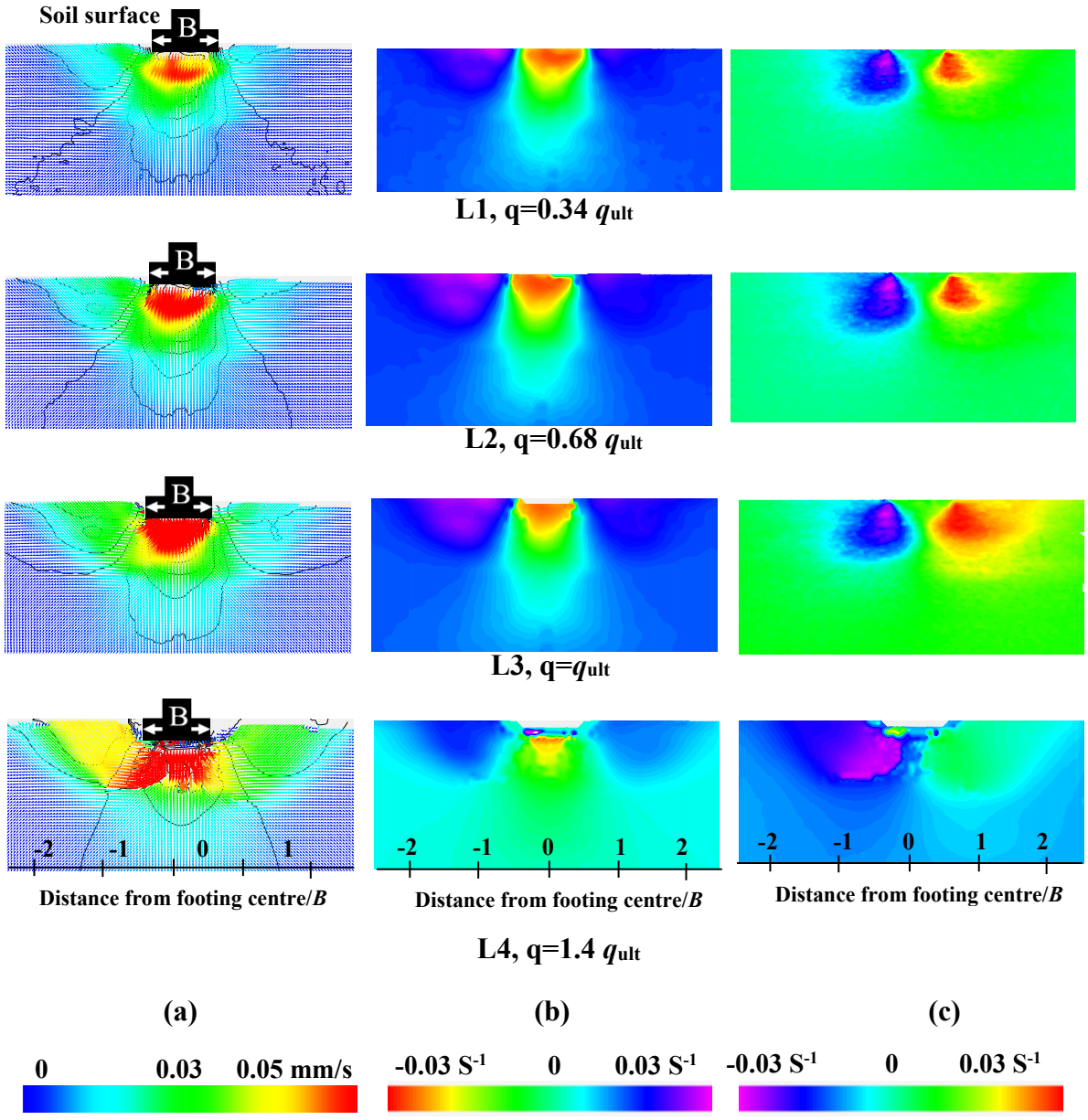


OR1 Particle size distribution curve of the sand (fine to medium-grained) using sieve analysis and high magnificant image

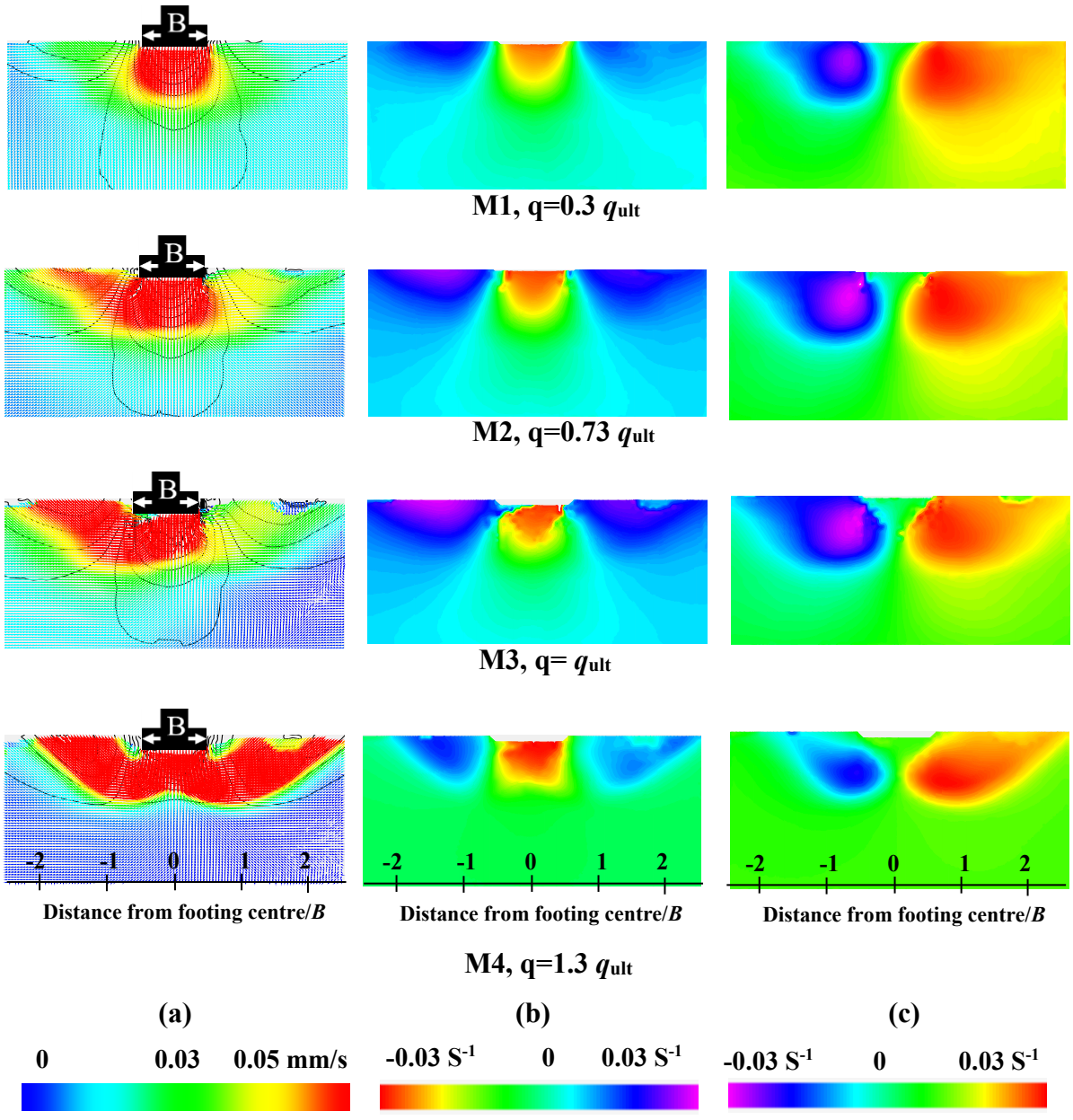
OR2 CPT test photo



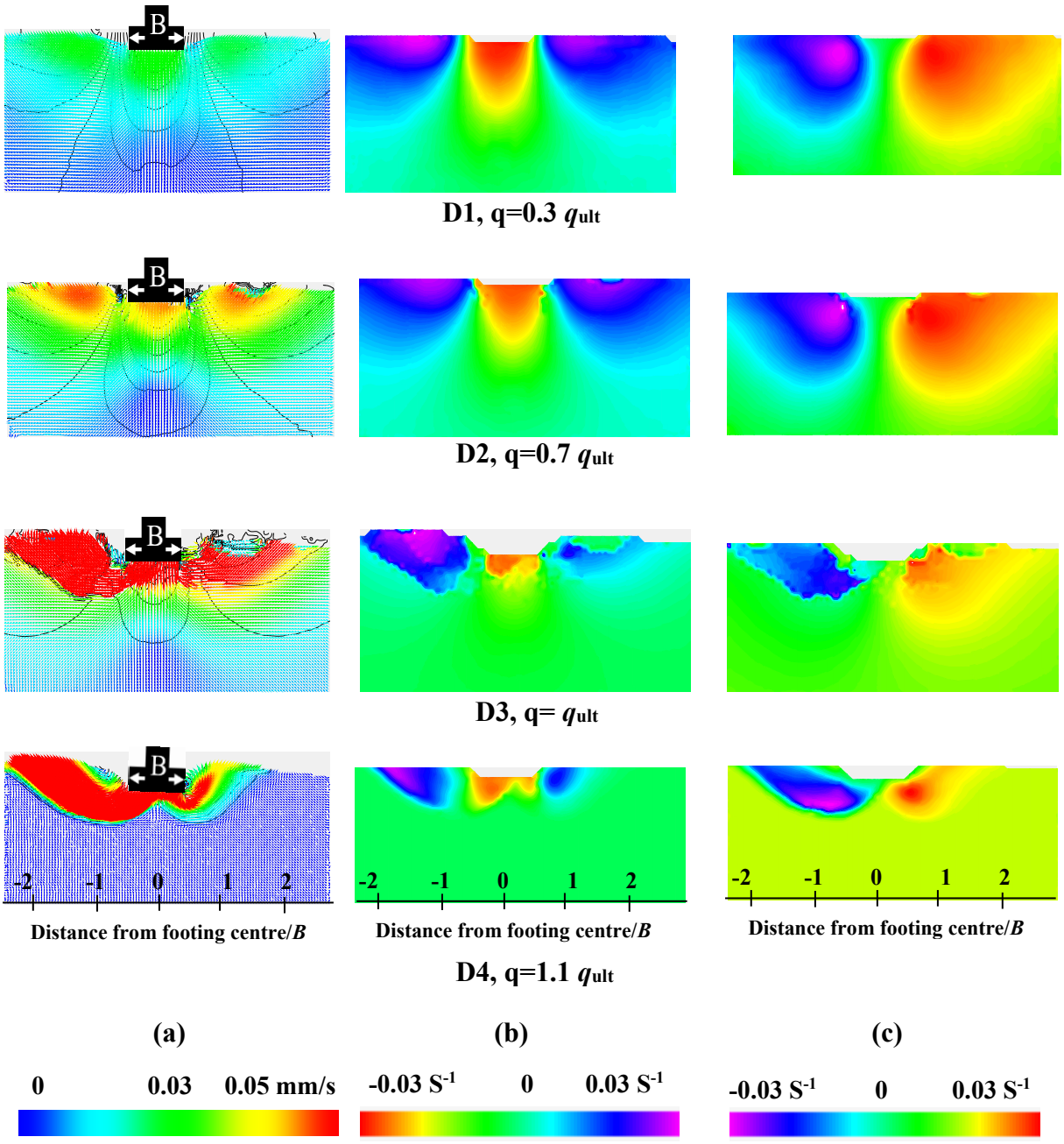
OR3 Comparison of PIV and FEM based results on the vertical displacement component (S_v/B) and horizontal displacement component (S_h/B) along a horizontal section at a depth of $0.5B$ below the footing on different sand packing



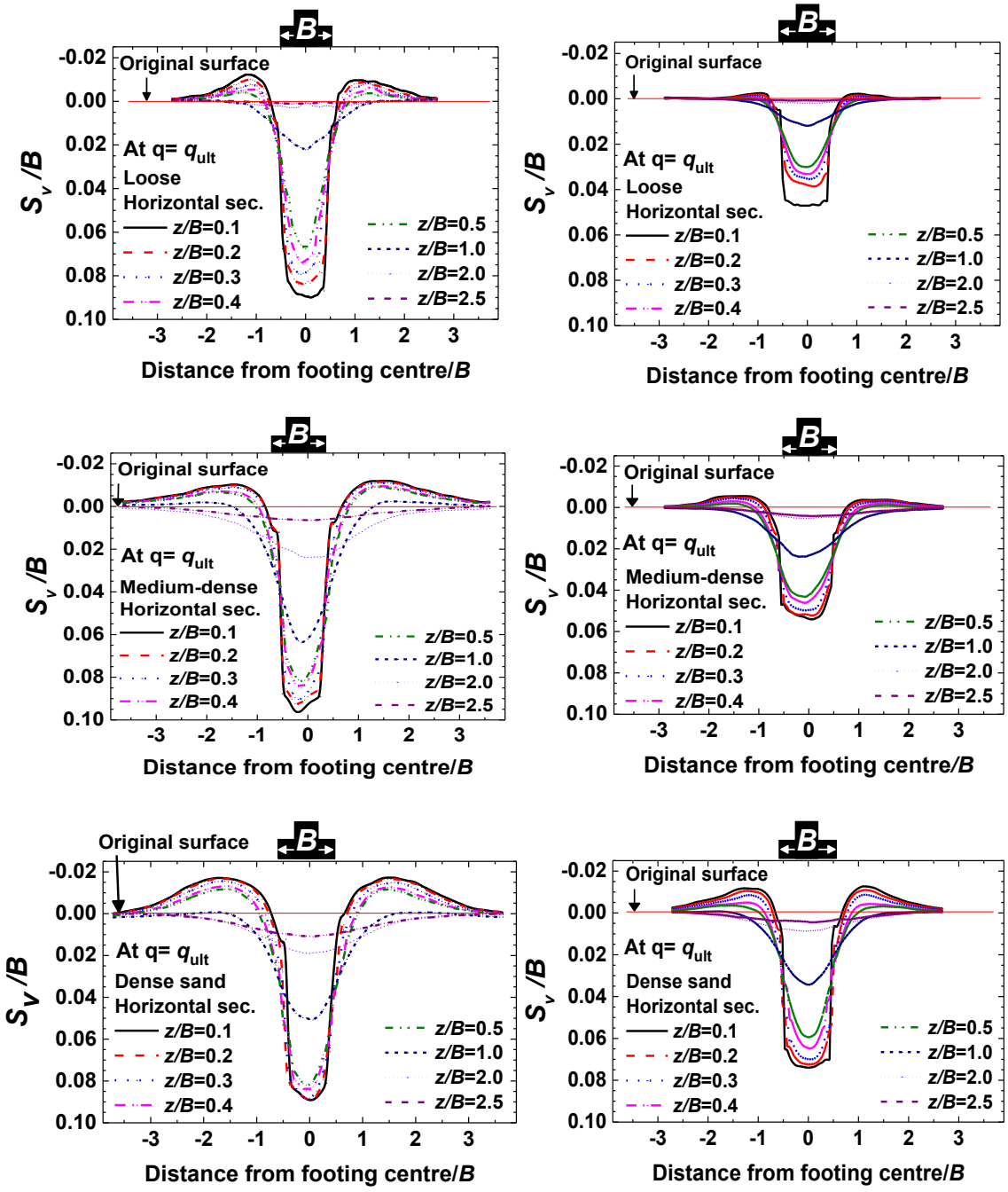
OR4 (a) Evolution or the resultant velocity vectors at a typical loads in loose sand and the scalar contours of the vertical velocity using PIV (b) vertical strain rate $\dot{\varepsilon_v}$ (c) horizontal strain rate $\dot{\varepsilon_h}$. Width of the footing, B= 38 mm



OR5 (a) Evolution or the resultant velocity vectors at a typical loads in medium-dense sand and the scalar contours of the vertical velocity using PIV (b) vertical strain rate $\dot{\varepsilon}_v$ (c) horizontal strain rate $\dot{\varepsilon}_h$. Width of the footing, B= 38 mm

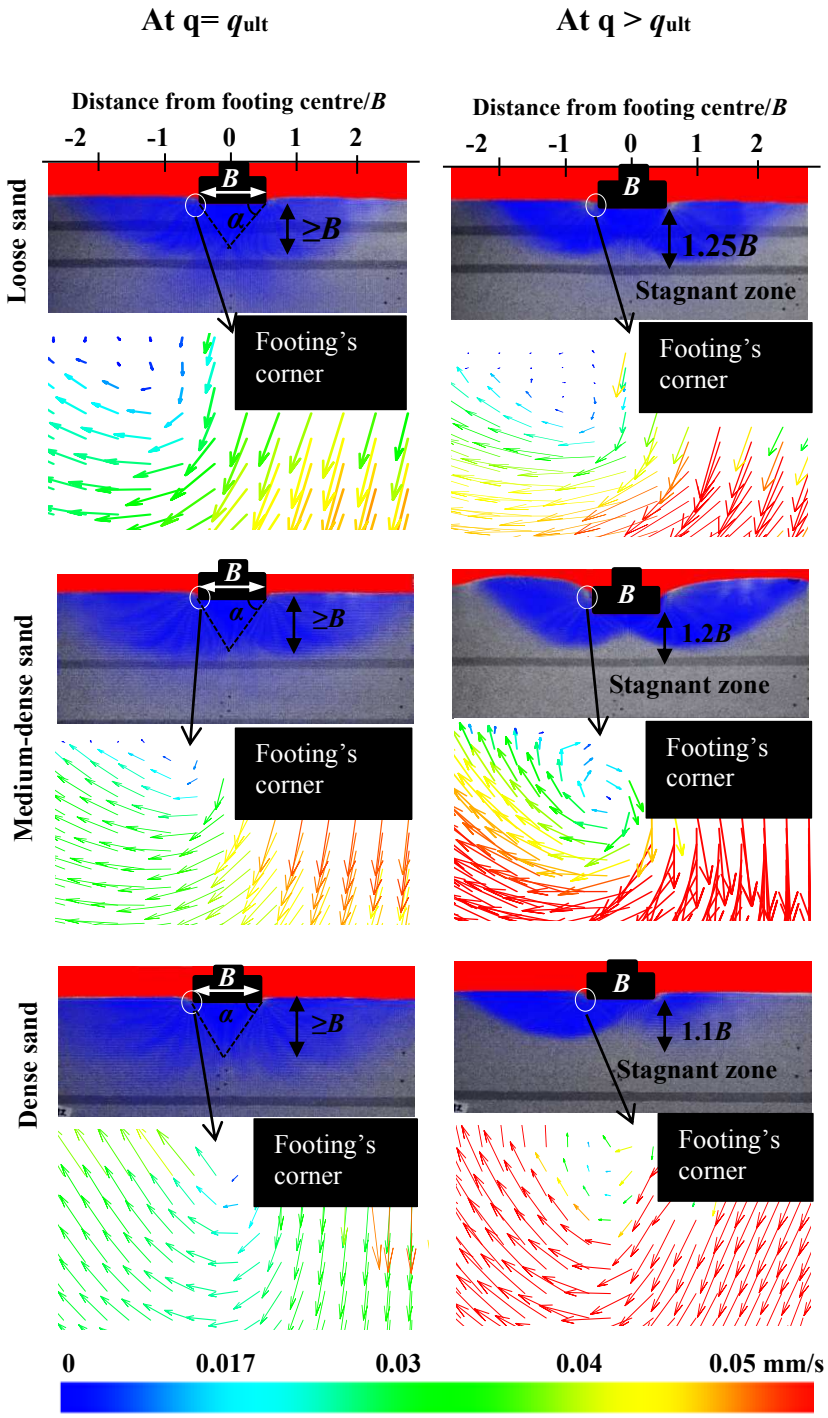


OR6 (a) Evolution or the resultant velocity vectors at a typical loads in dense sand and the scalar contours of the vertical velocity using PIV (b) vertical strain rate $\dot{\varepsilon_v}$ (c) horizontal strain rate $\dot{\varepsilon_h}$. Width of the footing= 38 mm

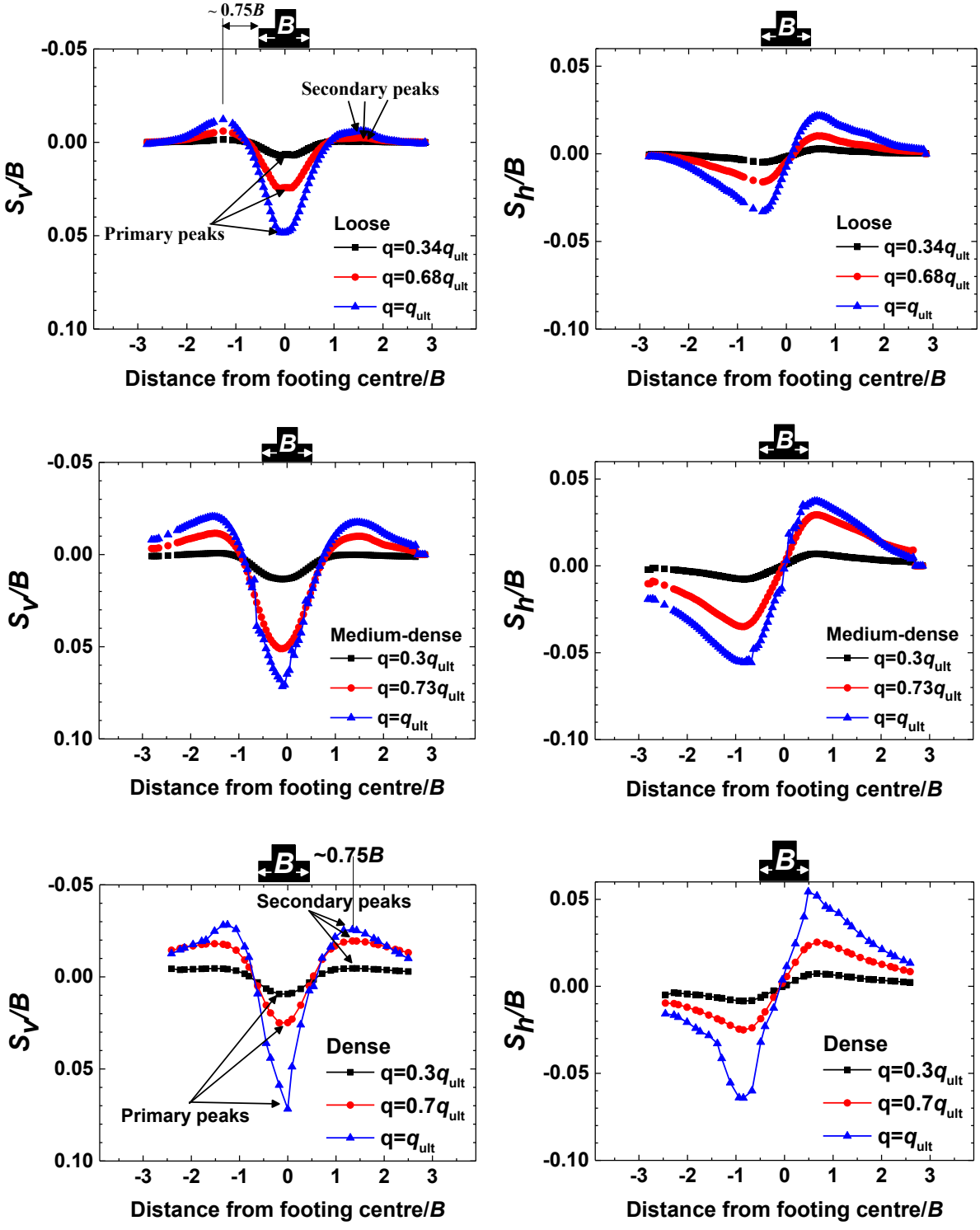


(a) B=38 mm (b) B=76 mm

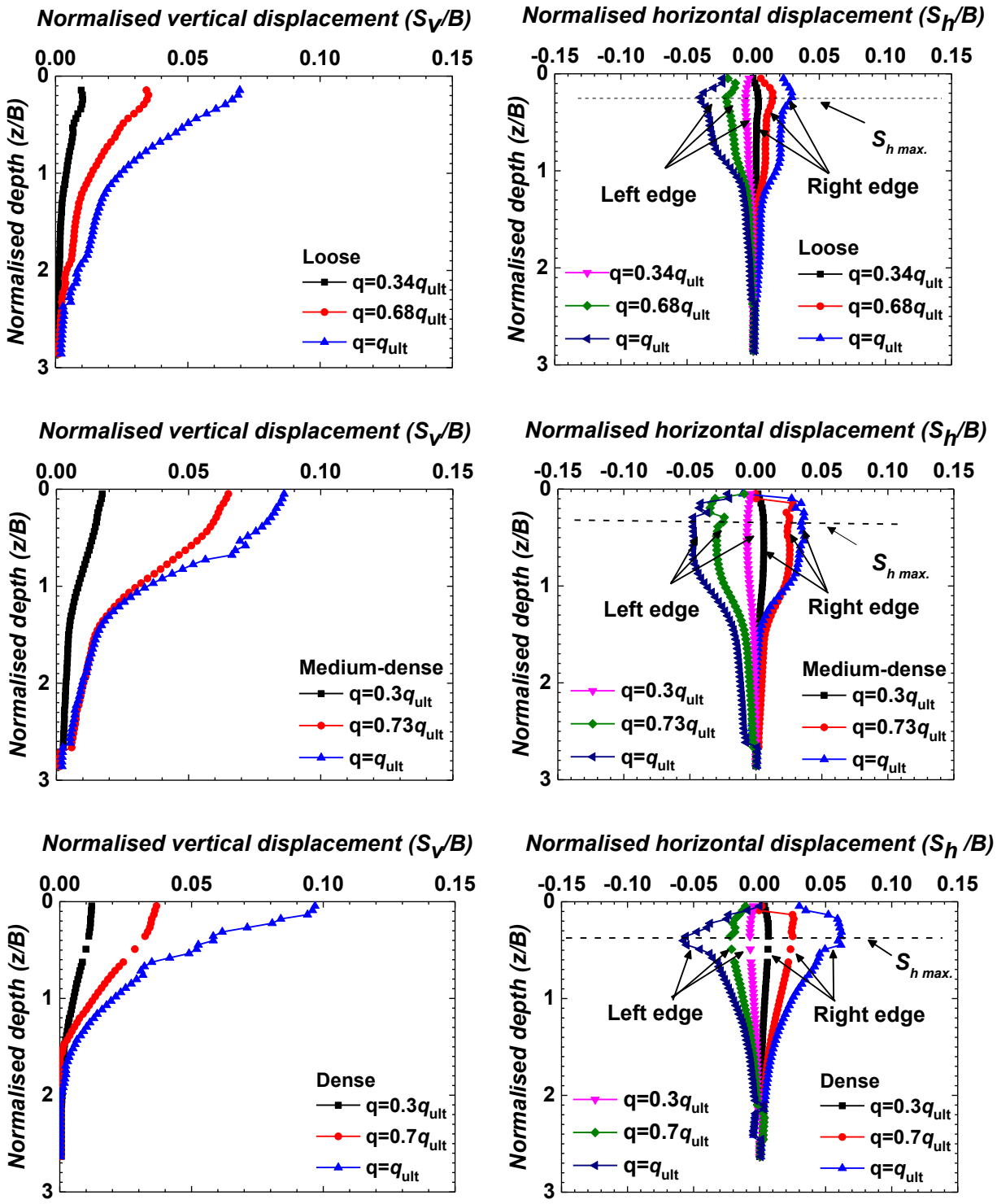
OR7 PIV-based normalised vertical displacement component profiles in different sand packings under the ultimate load (q=q_{ult}) along different horizontal sections at different depths (z/B) from the footing-soil interface



OR8 Vortex formation of resultant velocity vectors for footing (B=38) interacting with sand of different relative densities. Enlarged view of the corner of the footing is also presented here



OR9 (left) Normalised vertical displacement component (right) normalised horizontal displacement at a horizontal cross section 0.5*B* below footing using PIV at different loading levels in different sand packings. Signs: vertical displacement (positive down, negative up), horizontal displacement (Negative toward left, positive toward right from the central axis). *B* = 38 mm



OR10 Settlement profiles with depth z from the bottom surface of the footing at different loading levels: (left) normalised vertical displacement component, (right) normalised horizontal displacement for the sand packing. B= 38 mm