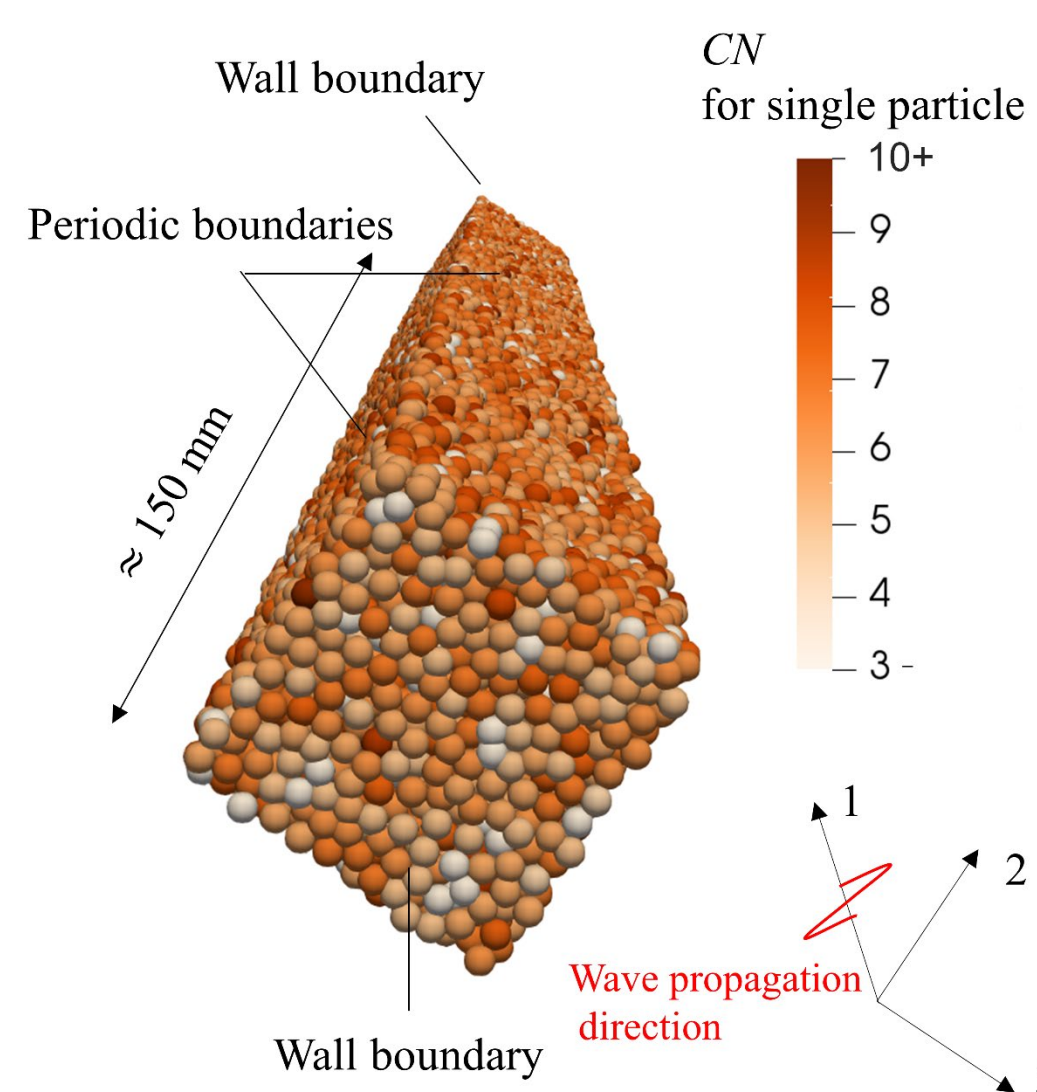


## 三軸試験における粒状体の弾性波応答のDEM解析

It is challenging to understand the stress wave responses of cohesionless particle assemblies including compression (P-) and shear (S-) wave velocities ( $V_p$  and  $V_s$ ). Discrete element method (DEM) enables to simulate the wave propagation during triaxial compression using spherical particles. Four samples are isotropically confined at various initial packing densities and then sheared monotonically up to the critical state. Small-amplitude wave propagation simulation is performed during shearing along the axis of loading.  $V_p$  and  $V_s$  are found to be well correlated with the stress state, as well as the soil fabric.

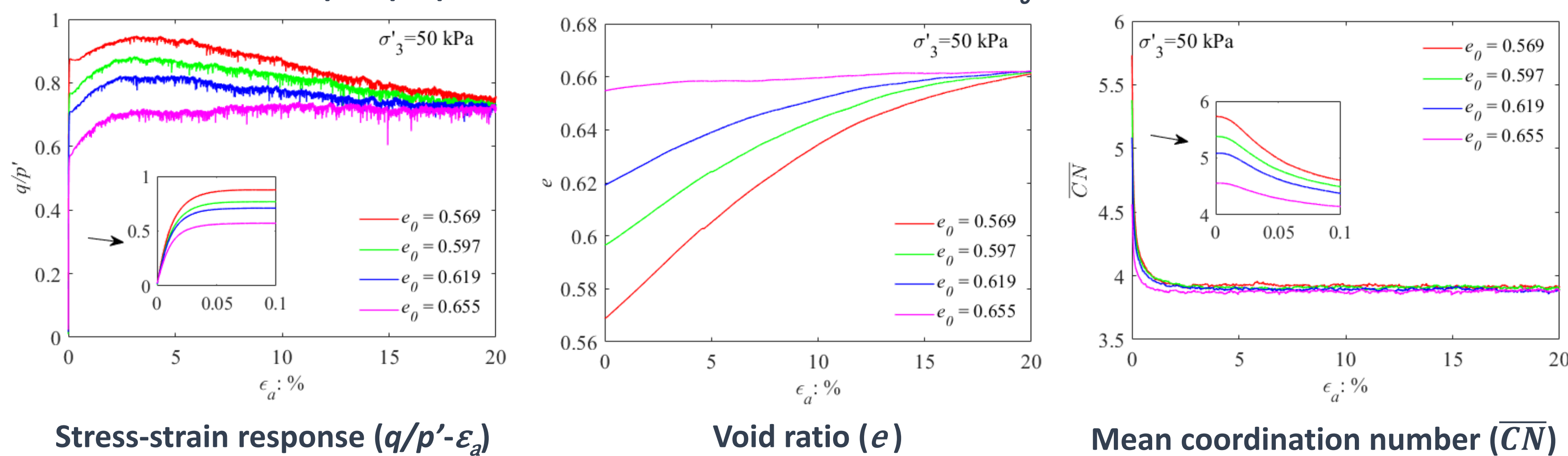
非粘性粒状体の弾性波応答、すなわちP波およびS波の速度 ( $V_p$  および  $V_s$ ) を理解することを目的とし、個別要素法 (DEM) を用いて、球状粒子供試体の三軸圧縮時の波動伝播のシミュレーションを行った。4種の様々な初期充填密度の供試体を等方的に拘束し、極限状態まで単調せん断した。さらに、せん断時に微小振幅の波動を载荷軸方向に伝播させた。その結果、 $V_p$  と  $V_s$  は、応力状態や土の堆積構造と高い相関があることがわかった。

### Representative random packing sample

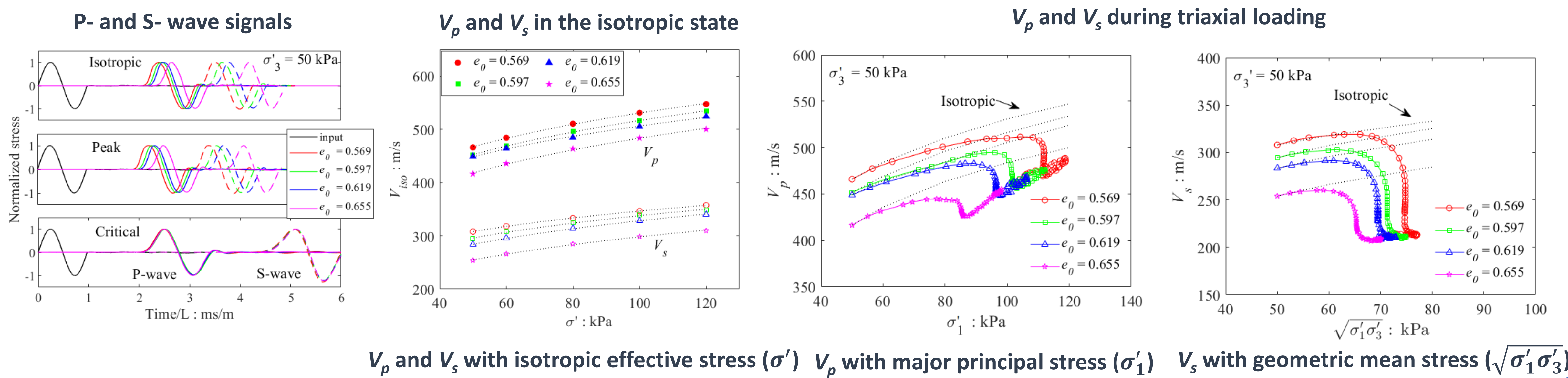


### Typical mechanical responses

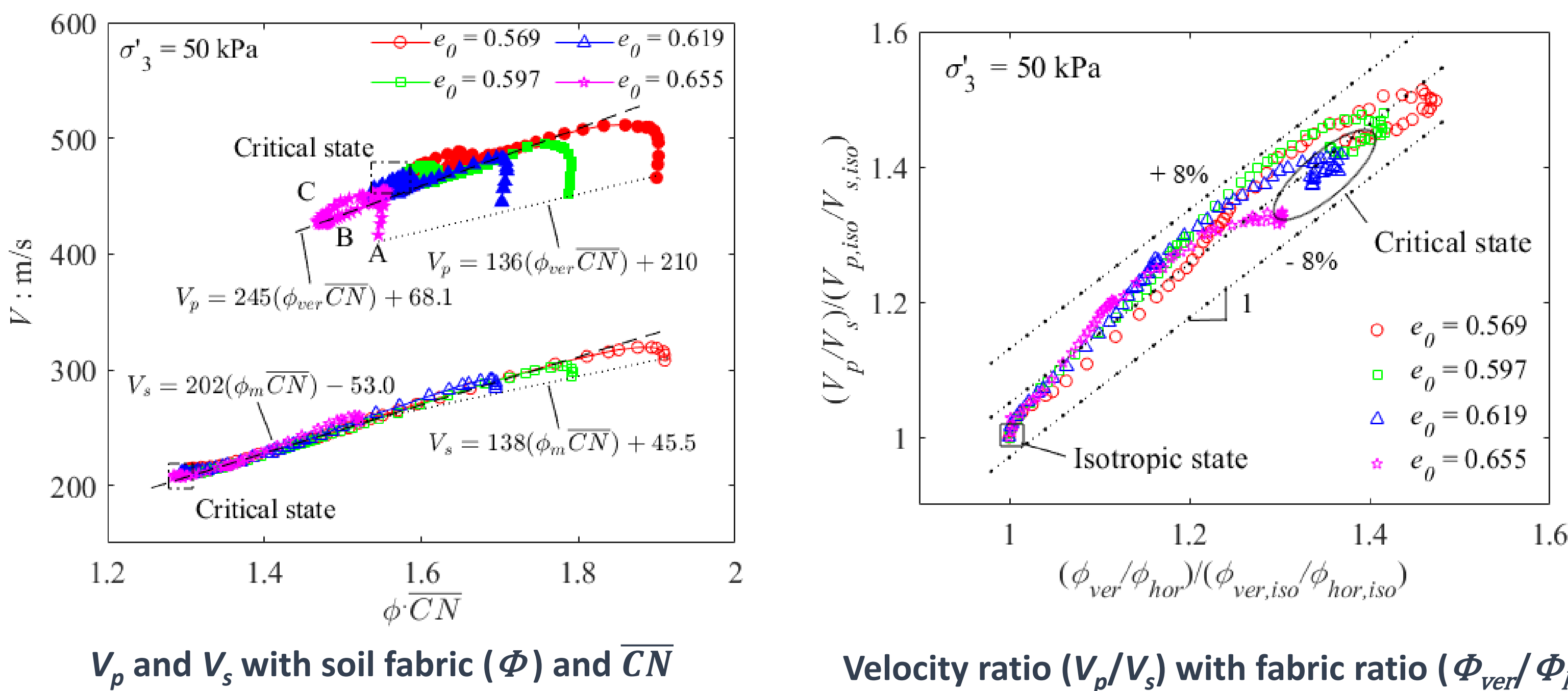
Four samples prepared under different initial void ratios:  $e_0 = 0.569, 0.597, 0.619, 0.655$



**Stress wave responses** Small amplitude of a sinusoidal pulse is activated to the wall boundaries to generate dynamic waves propagating through 1-axis



### Relationships between $V_p$ , $V_s$ and the soil fabric ( $\Phi_{ij} = \frac{1}{N} \sum_{k=1}^N n_i^k n_j^k$ )



### $V_p$ and $V_s$ in the critical state

