Table List

Table 1 Schematic diagram of joint setting, geometric parameters and loading conditions

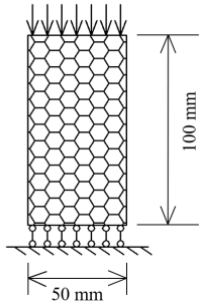
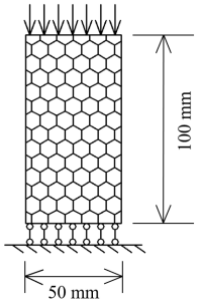
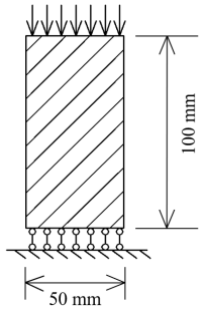
		
The direction I orthogonal to column axis	The direction II orthogonal to column axis	The direction parallel to column axis ($\boldsymbol{\beta}$ =45°)

Table 2 Schematic diagram of joint setting, geometric parameters and loading conditions of finite element model in numerical simulation verification

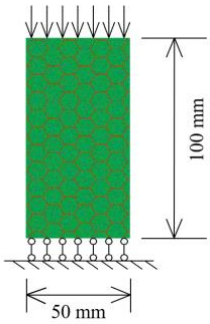
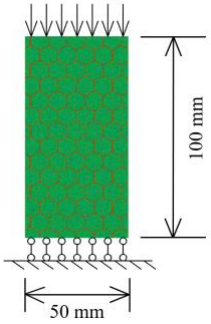
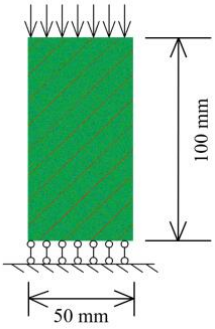
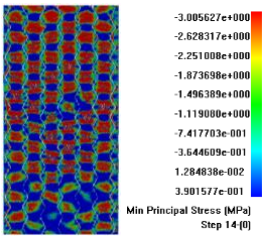
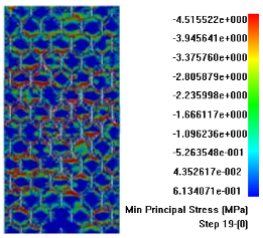
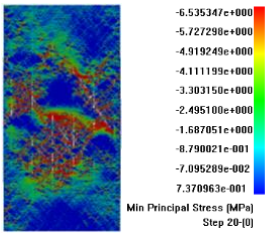
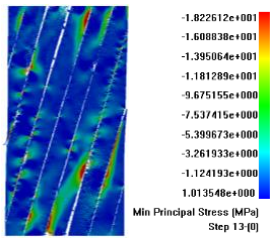
		
The direction I orthogonal to column axis	The direction II orthogonal to column axis	The direction parallel to column axis ($\boldsymbol{\beta}$ =45°)

Table 3 Values of mechanical parameters of finite element model in validation of numerical simulation

Material type	Heterogeneity index	Elastic modulus (***GPa***)	Uniaxial compressive strength (***MPa***)	Poisson's ratio	Friction angle (°)
Basalt	5	60	120	0.2	56.15
Joint	5	15	30	0.25	36

Table 4 Comparison of failure patterns between numerical tests and laboratory physical tests

 The minimum principal stress diagram of the numerical specimen in the direction I orthogonal to column axis	 The failure patterns of laboratory physical specimen in the direction orthogonal to column axis (Ji et al. 2017)	 The failure patterns of laboratory physical specimen in the direction orthogonal to column axis (Xiao et al., 2014)
 The minimum principal stress diagram of the numerical specimen in the direction II orthogonal to column axis		 The failure patterns of laboratory physical specimen in the direction orthogonal to column axis (Xiao et al., 2014)
 The minimum principal stress diagram of the numerical specimen in the direction parallel to column axis ($\boldsymbol{\beta}$=0°)	 The failure patterns of laboratory physical specimen in $\boldsymbol{\beta}$ =0°, the direction parallel to column axis (Ji et al. 2017)	 The failure patterns of laboratory physical specimen in $\boldsymbol{\beta}$ =0°, the direction parallel to column axis (Xiao et al., 2014)
 The minimum principal stress diagram of the numerical specimen in the direction parallel to column axis ($\boldsymbol{\beta}$ =15°)	 The failure patterns of laboratory physical specimen in $\boldsymbol{\beta}$ =15°, the direction parallel to column axis (Ji et al. 2017)	 The failure patterns of laboratory physical specimen in $\boldsymbol{\beta}$ =15°, the direction parallel to column axis (Xiao et al., 2014)

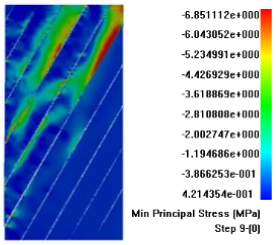
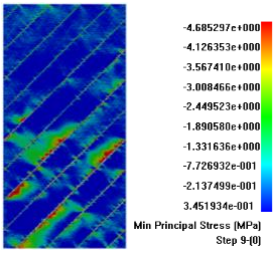
 The minimum principal stress diagram of the numerical specimen in the direction parallel to column axis (***β*** =30°)	 The failure patterns of laboratory physical specimen in ***β*** =30°, the direction parallel to column axis (Ji et al. 2017)	 The failure patterns of laboratory physical specimen in ***β*** =30°, the direction parallel to column axis (Xiao et al., 2014)
 The minimum principal stress diagram of the numerical specimen in the direction parallel to column axis (***β*** =45°)	 The failure patterns of laboratory physical specimen in ***β*** =45°, the direction parallel to column axis (Ji et al. 2017)	 The failure patterns of laboratory physical specimen in ***β*** =45°, the direction parallel to column axis (Xiao et al., 2014)

Table 5 Parameter value and calculation condition setting of numerical tests on size effect of CJBs

Size effect	Parameter value and calculation condition setting
Model sizes (***m***)	0.5×0.5, 1×1, 2×2, 3×3, 4×4
Heterogeneity indexes	5, 10, 20, 200
Column diameters (***cm***)	20, 40, 60, 80
Elastic moduli of columnar joint (***GPa***)	3.75, 7.5, 15, 22.5, 30
Residual strength coefficients of joints	0.1, 0.5, 0.75, 1
Model boundaries	The case of plane stress, the case between plane stress and plane strain, the case of plane strain

Table 6 Parameter value and calculation condition setting of numerical tests on anisotropy of CJBs

Anisotropy	Parameter value and calculation condition setting
Column dip angles $\boldsymbol{\beta}$ (°)	0, 15, 30, 45, 60, 75, 90
Heterogeneity indexes	5, 10, 20, 200
Column diameters (***cm***)	20, 40, 60, 80
Elastic moduli of joints (***GPa***)	3.75, 7.5, 15, 22.5, 30
Residual strength coefficients of joints	0.1, 0.5, 0.75, 1
The ratios of shift distance of the second joint set (%)	0, 20, 40, 50
The irregularity degrees of columns	Completely regular columns, approximately regular columns, moderately regular columns, irregular columns
Model boundaries	The case of plane stress, the case between plane stress and plane strain, the case of plane strain

Table 7 Values of mechanical parameters of rock and joint in CJBs

Material type	Heterogeneity index	Elastic modulus (***GPa***)	Uniaxial compressive strength (***MPa***)	Poisson's ratio	Friction angle (°)
Basalt	5, 10, 20, 200	60	120	0.2	56.15
Joint	5	3.75, 7.5, 15, 22.5, 30	30	0.25	36