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Monotonic mechanical behaviour of compacted completely decomposed granite with various inclusion levels of incineration bottom ash

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Keywords:
Completely decomposed granite; Incinerator bottom ash; Compaction degree; Characteristic volumetric content; Soil reinforcement

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IBA reinforced the CDG

(CDG)
Completely decomposed granite

Widely distributed in south China;
need to be reinforced when used

Seek reinforcement

(IBA)
Incineration bottom ash

High strength;
environment-friendly

Different compaction degrees of CDG

Monotonic triaxial tests

Different volumetric contents of IBA

Monotonic mechanical behaviour of CDG-IBA mixture

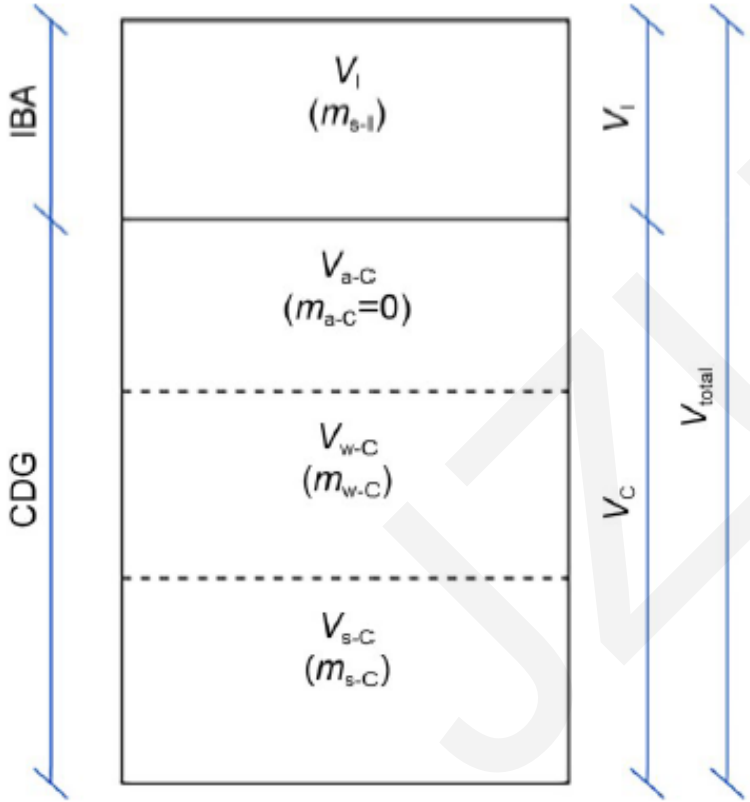
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Reinforcing mechanism by IBA

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Volumetric content of IBA

- **To quantify the composition and clearly illustrate the soil structure**



$$f_v = \frac{V_I}{V_{total}} \quad (1)$$

f_v : volumetric content of IBA

V_I : volume of IBA particles

V_{total}: total volume of the sample

Fig. 1. Definitions for soil constituents.

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Variations of soil shear strength

- A bi-linear increasing trend of peak deviator stress can be observed

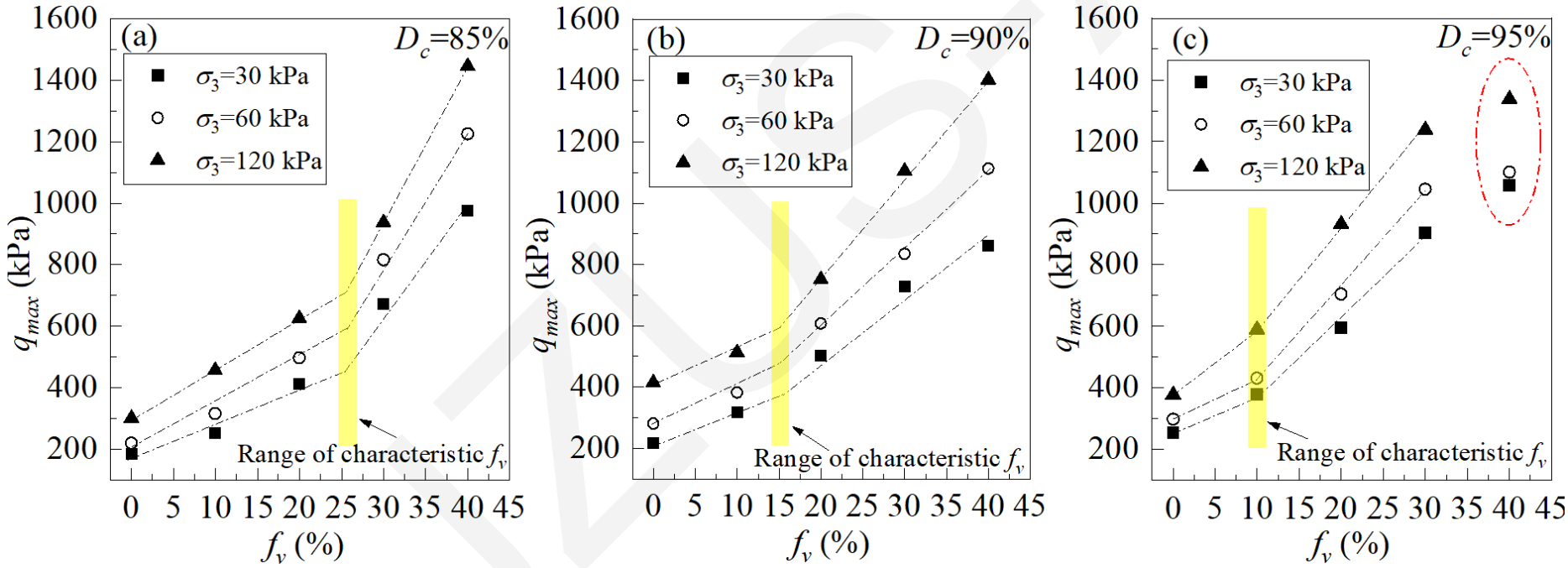


Fig. 2. Variations of peak deviator stress with f_v.

Coordination number

- To explain the mechanism of IBA reinforcement

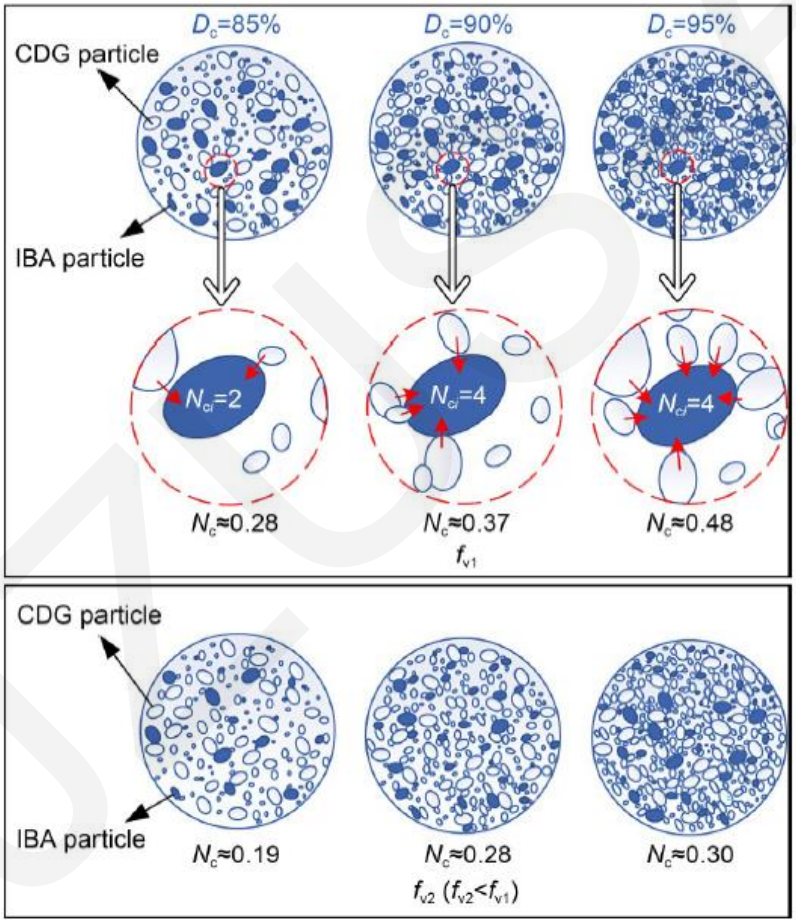


Fig. 3. Mechanism for reinforcement of CDG soil by the inclusion of IBA particles at two volumetric IBA contents.

Conclusions

- Increasing the volumetric content of IBA leads to an increase of the shear strength. This trend becomes more significant after the volumetric content of IBA increases beyond a characteristic value (CDG-CDG contacts dominate before value, CDG-IBA and IBA-IBA contacts are dominant after that). As the compaction degree increases, the characteristic volumetric content of IBA decreases due to the increasing proportion of IBA contacts.
- For practical engineering, increasing either the compaction degree of the CDG or the volumetric content of IBA can help achieve the target strength of the CDG-IBA mixture accordingly.

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