

Two-stage random sequential adsorption of discorectangles and disks on a two-dimensional surface

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The two-stage RSA models for packing of mixtures of anisometric particles have been studied. The 2D substrate was preliminary pre-patterned. Particularly, in so-called SD model, the substrate was pre-patterned by discorectangles and then discs were added and the situation was opposite in the DS model. The main parameters of the model are the disc diameter D , aspect ratio (length to width ratio) of the discorectangle, and level of preliminary pre-patterning.

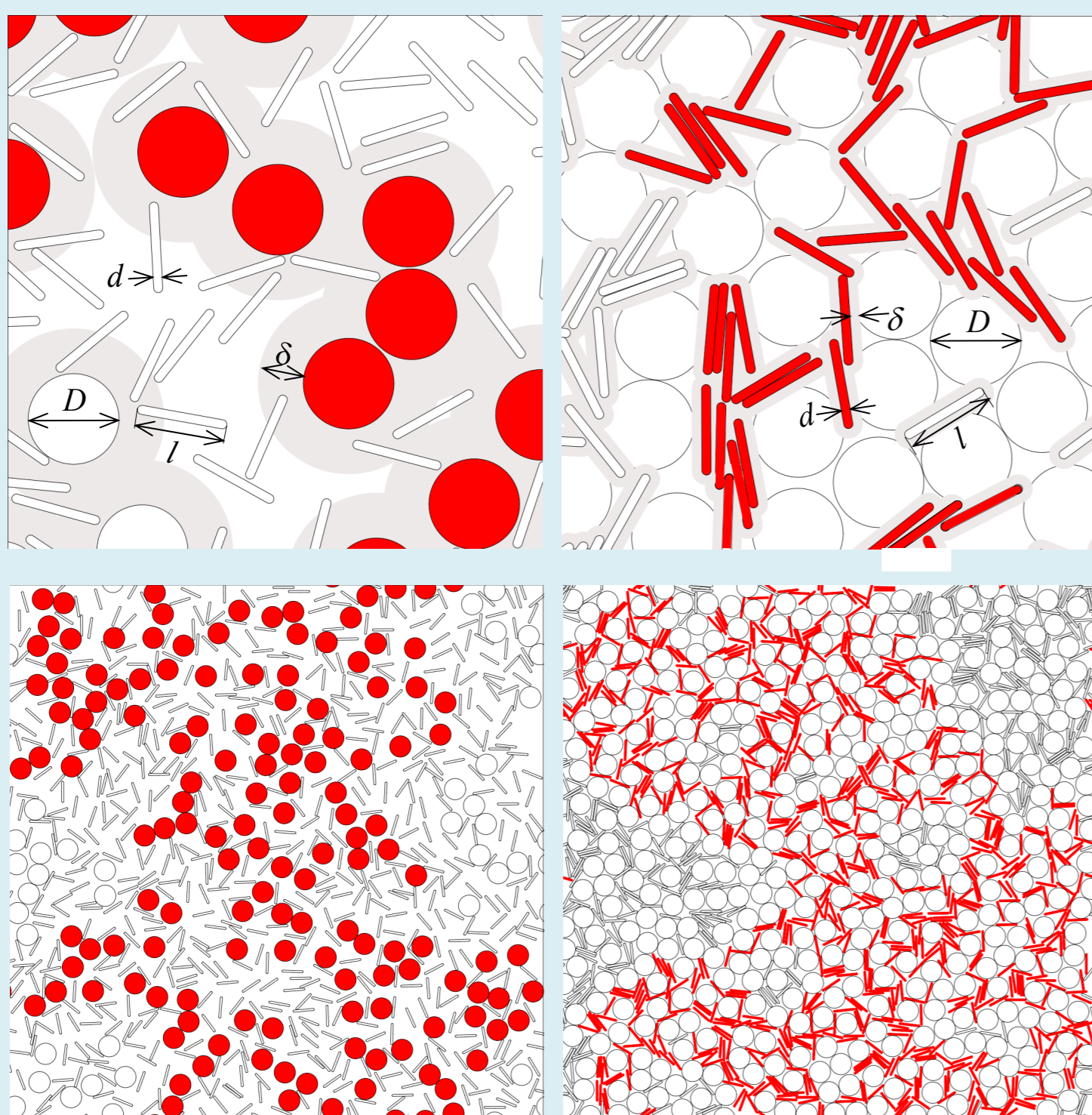


Figure 1: Illustrations of the SD (a) and DS (b) RSA packing models. Here, l and d are the length and thickness of discorectangle, $\varepsilon = l/d$ is the aspect ratio, and D is a diameter of disk.

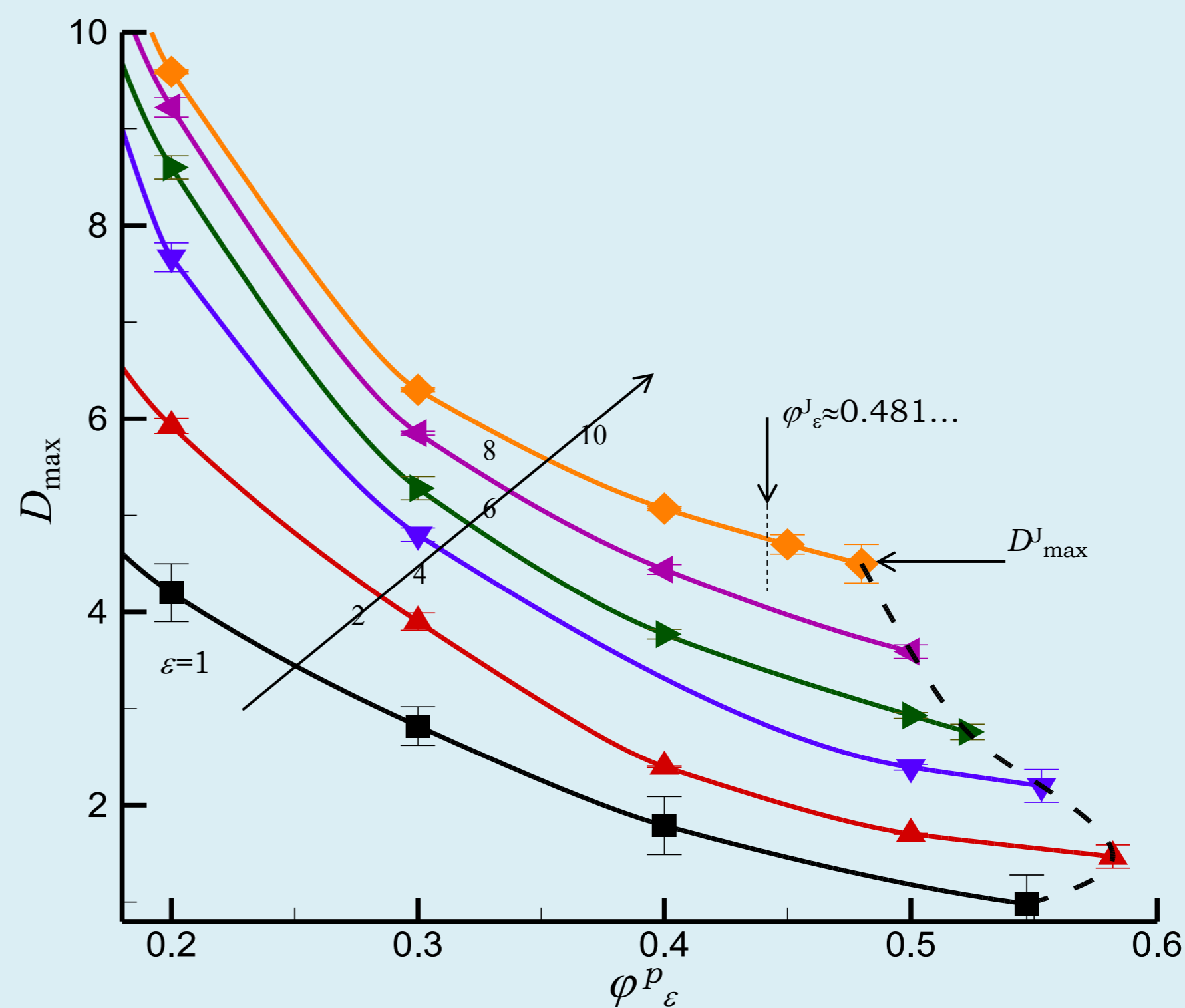


Figure 3: Maximum diameter of the disk D_{max} versus the concentration of preliminary deposited discorectangles φ^p_ε at different aspect ratios of ε . SD model.

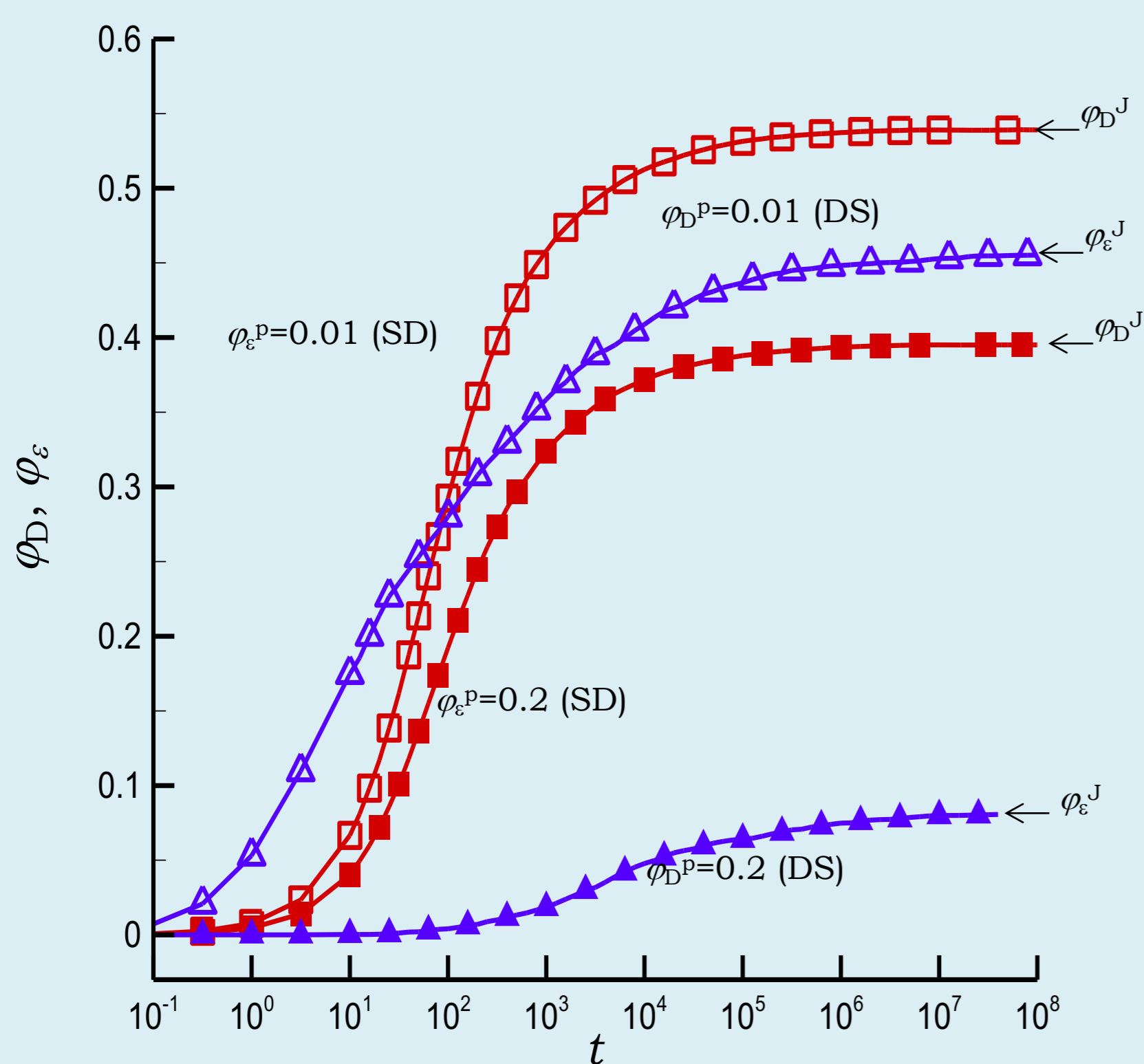


Figure 2: Time dependencies of the coverage's during the second stage of the deposition for the SD model (squares) $\varphi_D(t)$ and for the DS model (triangles) $\varphi_\varepsilon(t)$

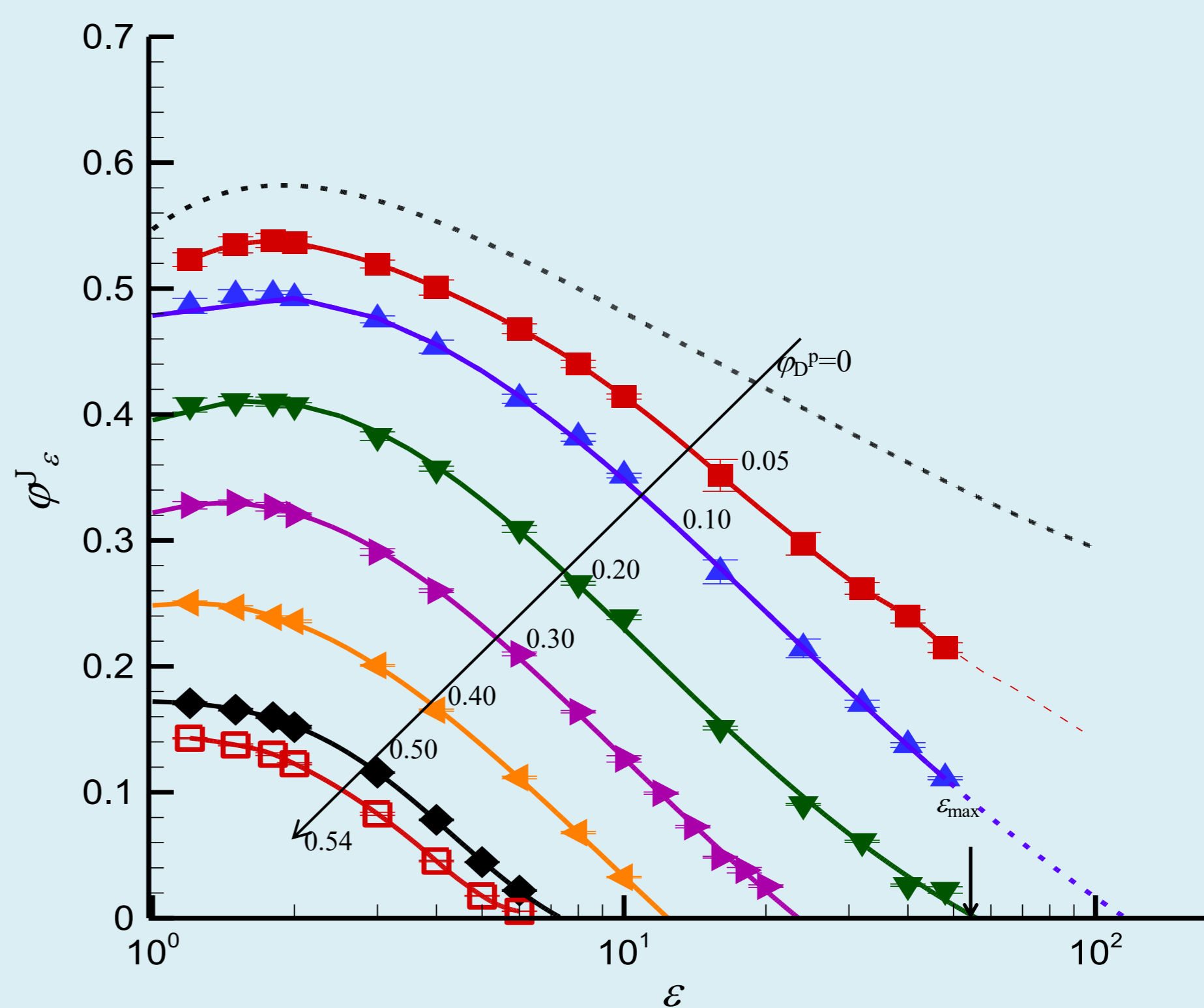


Figure 4: Jamming coverage of discorectangles φ_ε versus the aspect ratio ε at different coverage of preliminary deposited disks φ^p_D . DS model, $D = 2$.

Conclusions

The two stage deposition RSA models on the pre-patterned surfaces were analyzed. In these models, at the second stage the particles were deposited in voids formed at the first stage. The behaviour of the jamming coverages for both DS and SD models revealed many intriguing properties of such packings.

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