

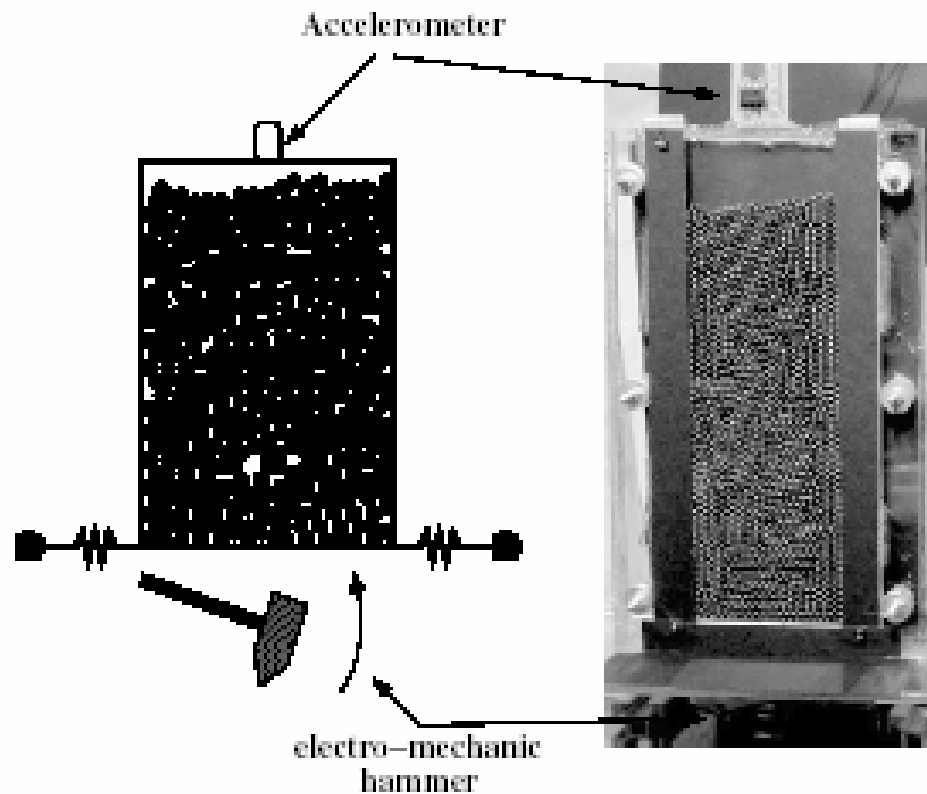
Stukturna karakterizacija granularnog materijala tokom procesa kompaktifikacije

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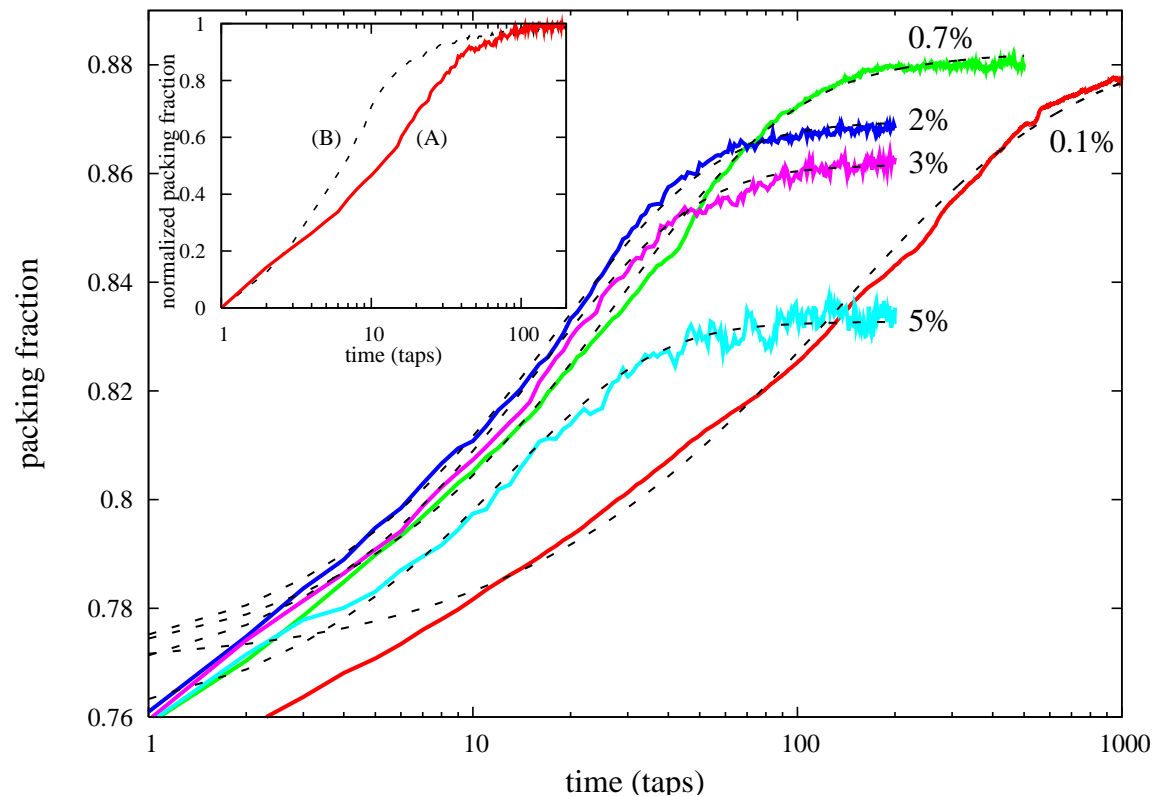
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EXPERIMENTAL SET-UP : COMPACTION OF TWO DIMENSIONAL GRANULAR SYSTEM



- I $y \rightarrow y' = (1 + \xi)y$
 $\xi = 0.1\% - 5\%$
- II MDS (film)

- More dissipative and rough disks (A)
 $\varepsilon_0 = 0.6$ and $\mu = 0.4$
("GRUBE")
- Less dissipative and smooth disks (B)
 $\varepsilon_0 = 0.9$ and $\mu = 0.2$
("FINE")



Temporal evolution of the packing fraction obtained for the grains of type (A) and for various tapping intensities 0.1% (red), 0.7% (green), 2% (blue), 3% (violet) and 5% (light blue). The dashed curves are the Mittag-Leffler fits. (“GRUBE”)

Inset: evolution of the normalized packing fraction for two kinds of the grains (disks (A) - solid line and disks (B) - dashed line), at $\xi = 3\%$.

VORONOI TESSELLATION

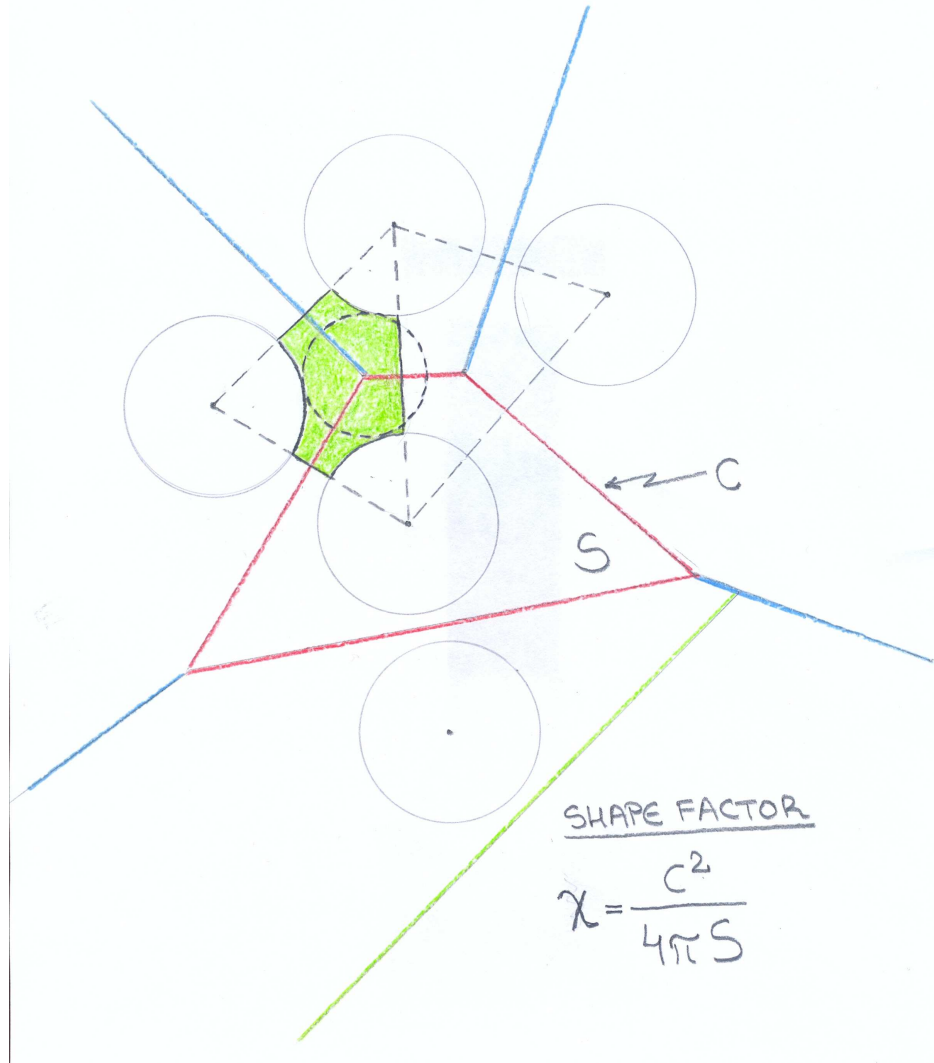
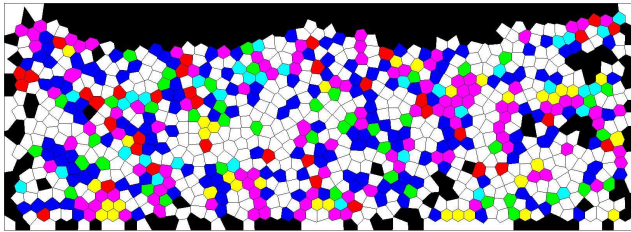
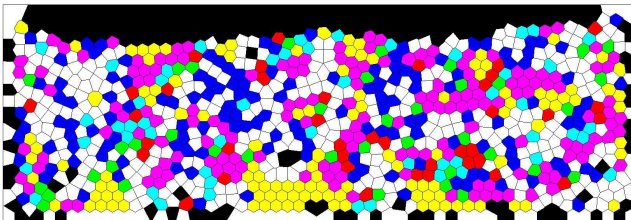


FIG. 1. Voronoi diagrams of a packings formed in the simulation at different stages of compaction. Diagrams correspond to $t = 2, 8, 15, 30, 50,$ and 70 taps. Voronoi cells are colored according to their shape factor ζ . Color coding of Voronoi polygons is defined in Tab. I. These results refer to a disk of type (A). The tapping intensity is $\alpha = 0.7\%$. (“GRUBE”)



$t=2$

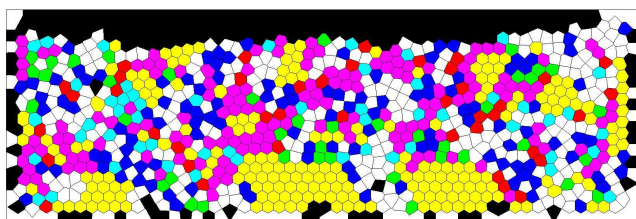


$t=8$

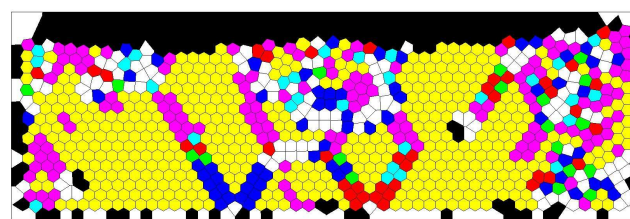
- TABLE I. The table summarizes the classification of Voronoi polygons into eight groups $G_1 - G_8$ according to values of shape factor. For densities corresponding to the packings
- obtained in simulation, the distribution of ζ diminishes above ≈ 1.30 .

Group	Range	Colour
G_1	$\zeta < 1.108$	yellow
G_2	$1.108 < \zeta < 1.125$	magenta
G_3	$1.125 < \zeta < 1.130$	cyan
G_4	$1.130 < \zeta < 1.135$	red
G_5	$1.135 < \zeta < 1.140$	green
G_6	$1.140 < \zeta < 1.160$	blue
G_7	$1.160 < \zeta < 1.250$	white
G_8	$1.250 < \zeta$	black

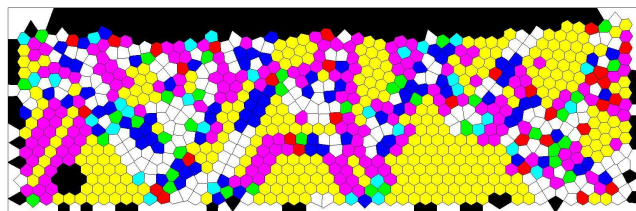
FIG. 1. nastavak...



t=15



t=50

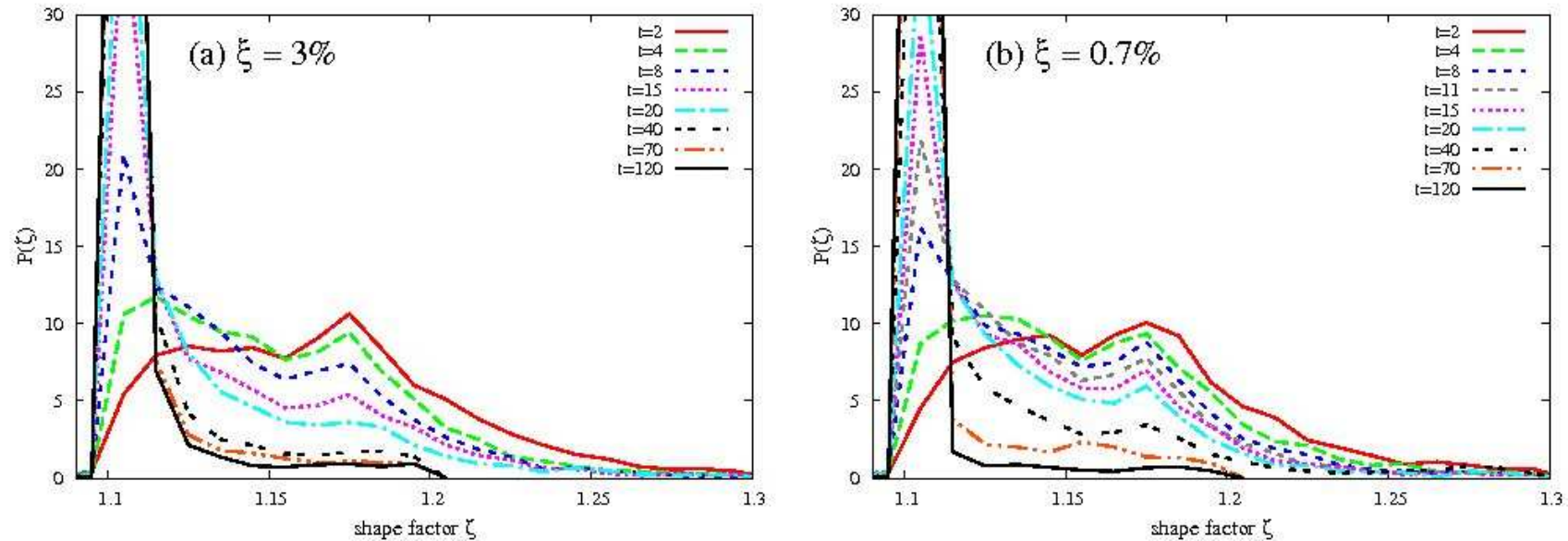


t=30



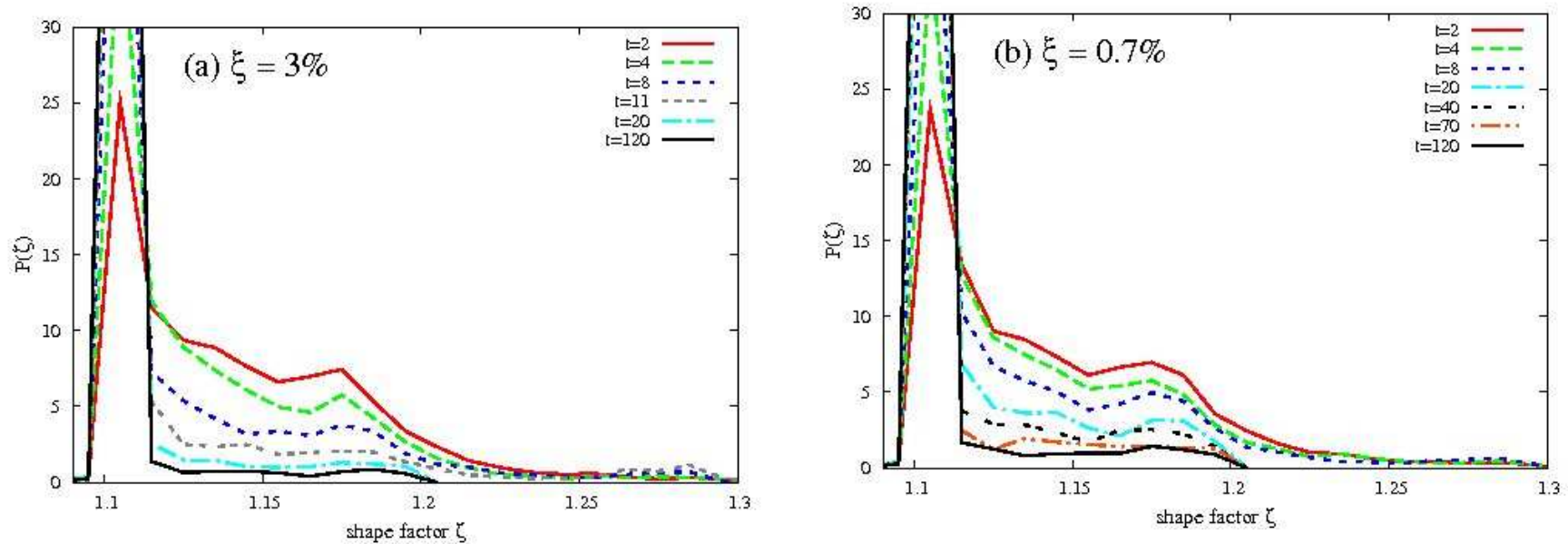
t=70

FIG. 2. EVOLUTION OF THE PROBABILITY DISTRIBUTION $P(\zeta)$ OF THE SHAPE FACTOR MORE DISSIPATIVE DISKS (A) (“GRUBE”)



- (a) The temporal evolution of the probability distribution $P(\zeta)$ of the shape factor ζ for the more dissipative disks (A) at tapping intensity $\xi = 3\%$.
- (b) The temporal evolution of the probability distribution $P(\zeta)$ of the shape factor ζ for the more dissipative disks (A) at tapping intensity $\xi = 0.7\%$.

FIG. 3. EVOLUTION OF THE PROBABILITY DISTRIBUTION $P(\chi)$ OF THE SHAPE FACTOR LESS DISSIPATIVE DISKS (B) (“FINE”)



(a) The temporal evolution of the probability distribution $P(\zeta)$ of the shape factor ζ for the less dissipative disks (B) at tapping intensity $\xi = 3\%$.

(b) The temporal evolution of the probability distribution $P(\zeta)$ of the shape factor ζ for the less dissipative disks (B) at tapping intensity $\xi = 0.7\%$.

FIG. 4. Time evolution of the packing fraction $\rho(t)$ when the tapping intensity is changed at $t_w = 30$ from 3% to 0.5% (dashed line), and from 0.5% to 3% (solid line). The points A1 and A2 correspond to the packings with equal density $\rho(t_w) = 0.828$, at $t_w = t_1 = 30$ and $t_2 = 39$.

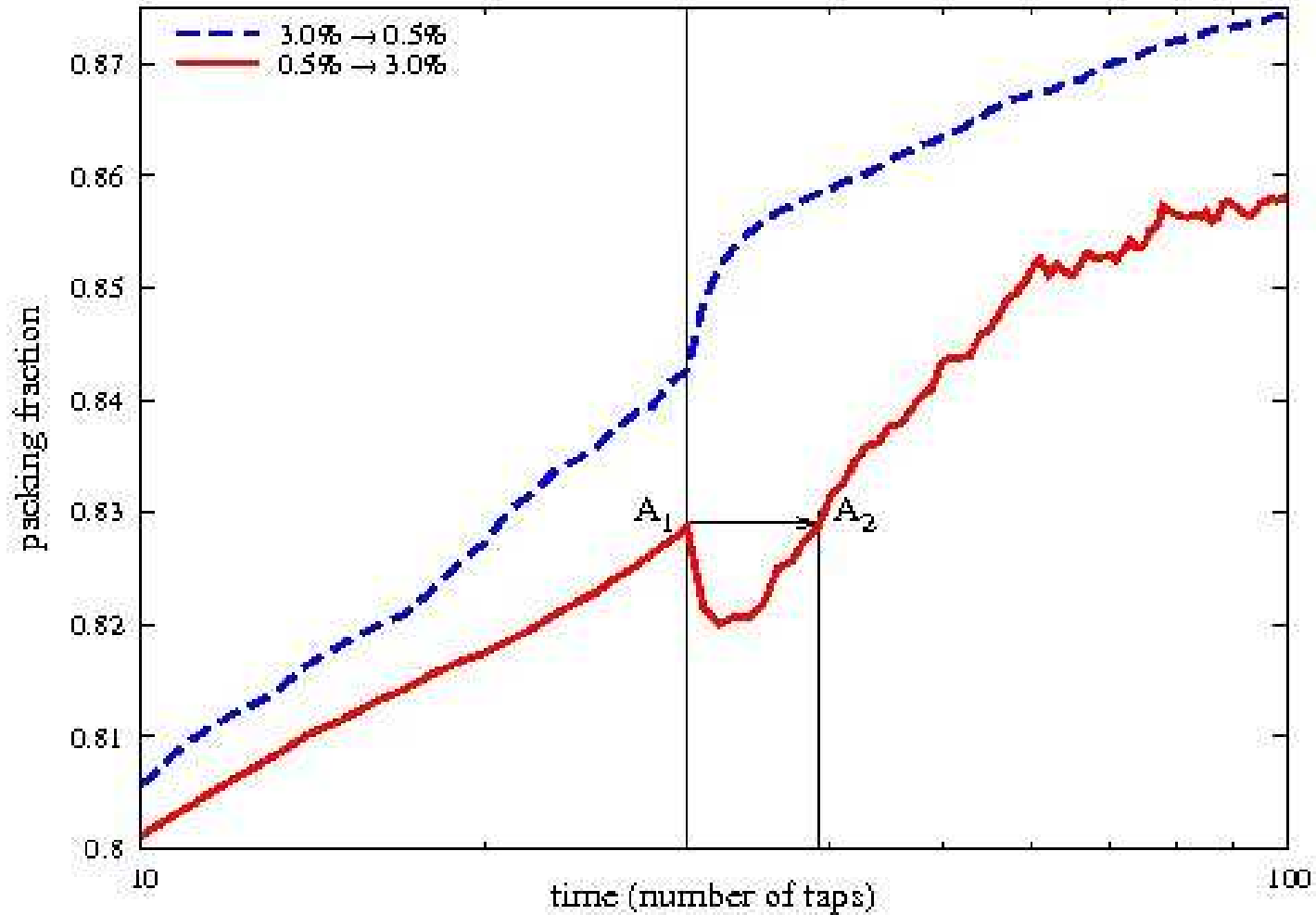
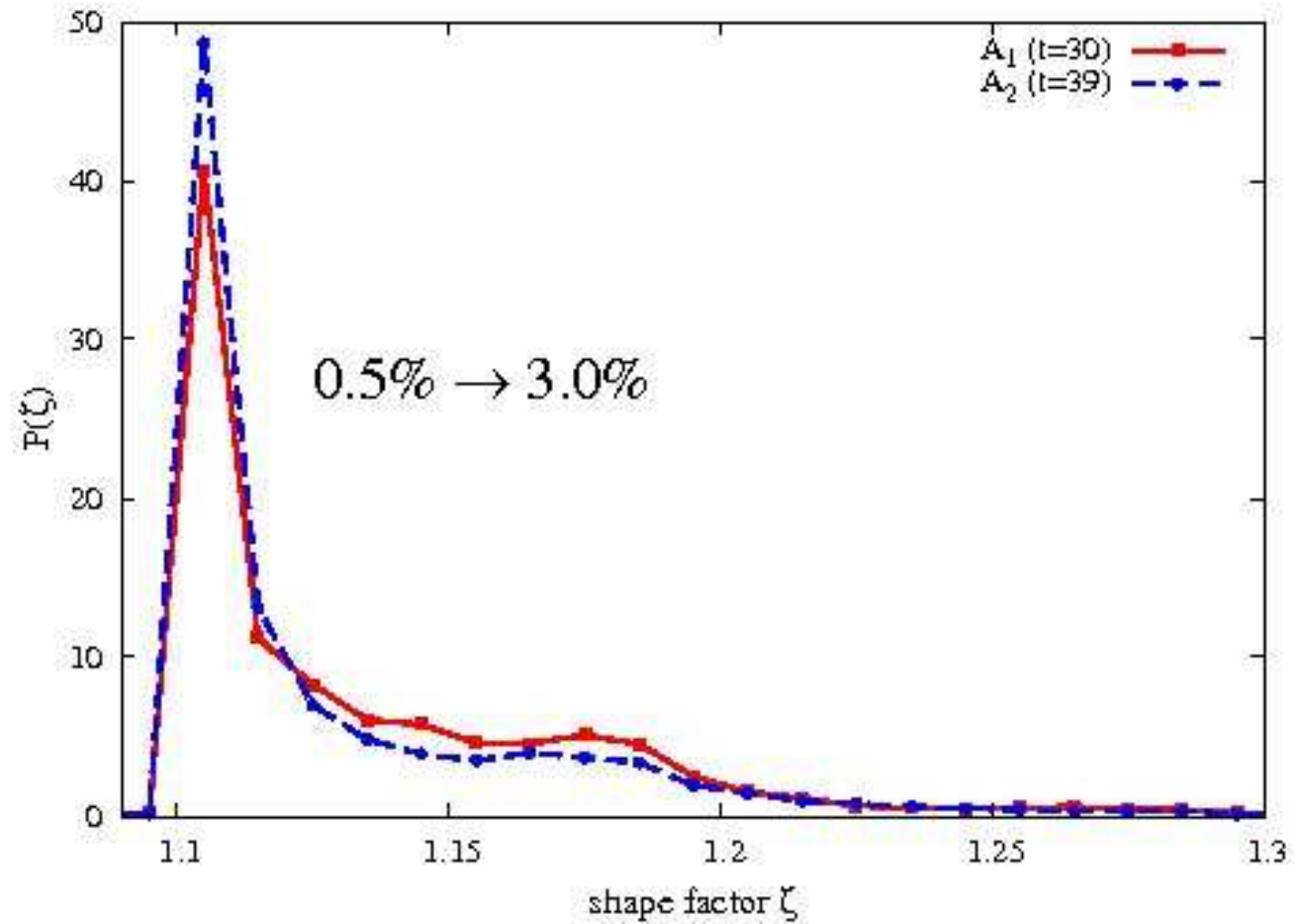
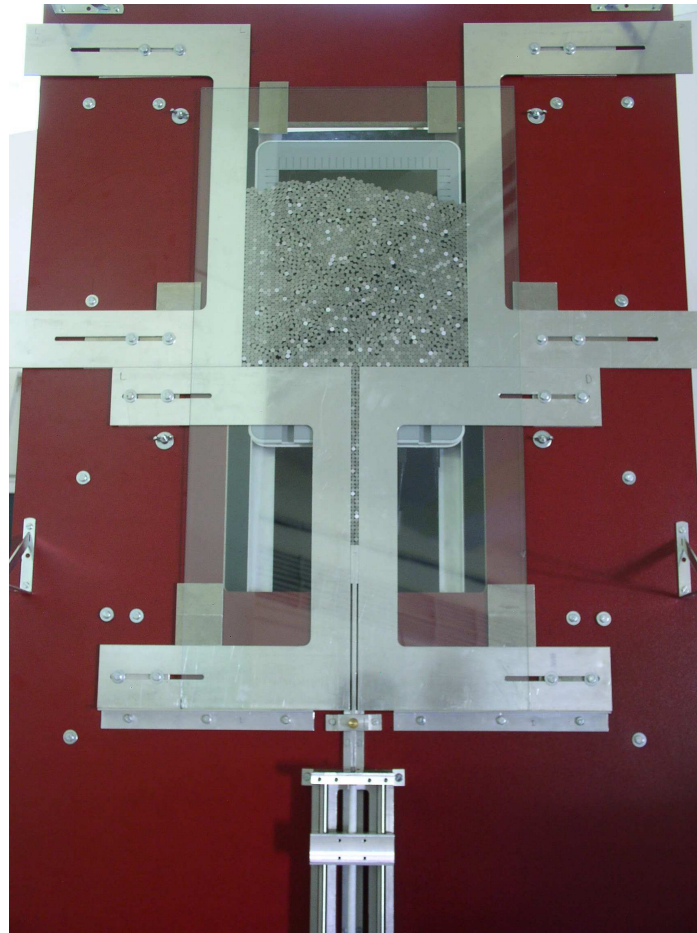


FIG. 5. Distributions $P(\zeta)$ of the shape factor for the packings at points A1 (solid line) and A2(dashed line) in Fig. 4. These distributions correspond to packings having the same density.





PHOTOGRAPH OF THE EXPERIMENTAL SET-UP

FIG. 6. Simulation (lines) and experimental (symbols) results for the probability distribution $P(\zeta)$ of the shape factor ζ . Experimental results correspond to the packings of disks of diameter $d = 4$ mm and 6 mm at densities $\rho = 0.829$ and 0.828, respectively. The simulation results correspond to the packings of less dissipative disks (B) at densities $\rho = 0.825$ ($t = 2$, $\xi = 0.7\%$) and $\rho = 0.830$ ($t = 2$, $\xi = 3\%$).

