Schweigert, Schweigert, and Peeters Reply: Rinn and Maass [1] claim that the Brownian dynamics (BD) simulation results of Schweigert *et al.* [2] are analyzed incorrectly. Furthermore, they claim that the definition for the intershell diffusion coefficient (D_θ) used by Schweigert *et al.* [2] makes sense only when the particles remain in the same shell.

The whole misunderstanding is based on the fact that Rinn *et al.* [1] believe that one needs to follow the trajectory of each individual particle in order to calculate D_θ. Within such an approach, one is in trouble when a particle jumps from one shell to another shell. In order to remove this switching of particles between shells they analyzed their data in two different ways: (1) ignoring shell jumps (open symbols in Fig. 2 of Ref. [1]); and (2) taking care of shell jumps (solid symbols in Fig. 2 of Ref. [1]).

When Rinn *et al.* ignored shell jumps they found a very large "unrealistic" reduction of D_θ with decreasing $\Gamma < 20$. Notice that for $\Gamma < 20$ the diffusion coefficient D_θ attains values which are even smaller than in the $\Gamma > 100$ region, where the rigid crystal phase sets in. On physical grounds, this makes no sense.

In their second approach, Rinn *et al.* calculated D_θ by "taking care of shell jumps." It is not clear what they mean with this and how they calculated D_θ. Did they remove the particles which performed a shell jump from their calculation of D_θ? If so, it is not surprising that the results are different from those of Schweigert *et al.* [2]. As explained in Refs. [2,3], the radial fluctuations (and shell jumps) are essential for the stabilization of the intershell (or angular) diffusion in the reentrant region. The numerical results of Rinn *et al.* (solid symbols in Fig. 2 of Ref. [1]) saturate for $\Gamma < 20$ which is hard to understand physically. If no reentrant behavior is present, one expects that D_θ keeps growing with decreasing Γ.

In our approach the 2D cavity was divided into three circular regions, which we will call shells. We found that the particles are arranged in shells even for smaller coupling parameters $\Gamma = 7$ and 3. The particles spend most of their time in a specific shell, and our analysis based on the separation of the particles over shells is valid.

Because $\Gamma < \infty$ the particles do not have fixed position but they move in time, and can move within each shell and even from one shell to another shell. These circular regions are defined in a similar way as explained in Ref. [3] of the comment of Rinn *et al.* As was shown earlier by us [4], with decreasing coupling parameter the probability for particle jumps between the shells increases. At $\Gamma = 6$, where the reentrant behavior was found experimentally [3], the number of particles in each shell can change. The system can transit from the ground state (3:9:18) to the metastable state (4:8:18) and back. In Fig. 1(a) we show the number of particles in the most inner shell (1) and the intermediate shell (2) as a function of our calculation time. The presented results refer only to a short-time interval to demonstrate that the jumps of the particles do not affect the averaged angular motion [see Fig. 1(b)]. During the simulation, at each time step we know the angular displacement of each particle. Then for each particle we determined in which shell it is located and added its $\theta(t)$ value to the shell angular summation and added a 1 to the summation over the particles. Thus it does not matter what the previous history was of this particle, i.e., in which shell it was situated in a previous time step. The particle can jump from one shell to another shell as often as it wants. At each given time the particle is sitting in a definite shell and participates in its angular motion.

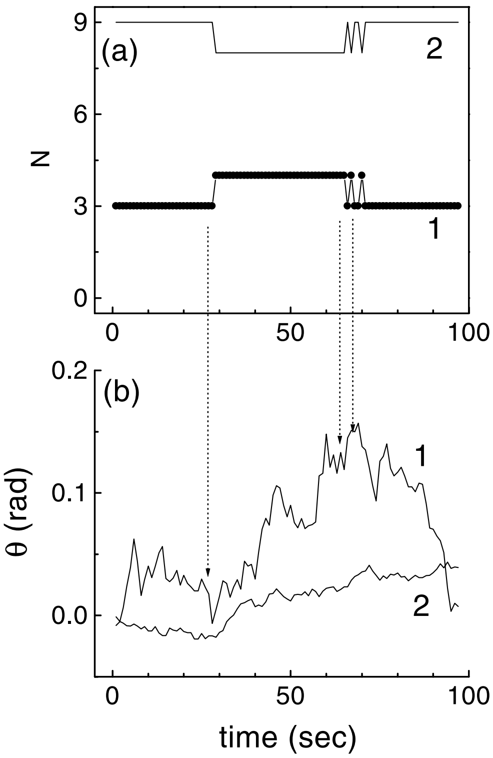

FIG. 1. (a) Time evolution of the number of particles in the most inner shell (1) and the intermediate shell (2) for $N = 29$. (b) The time evolution of the corresponding angular displacement.

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