sampling, it would mean that women with occult proliferative lesions in the control group pool preferentially refused to volunteer for our study. This seems unlikely. The difference in cytologic results was significant when corrected for age, as indicated in our reference 19. Page and DuPont suggest that we should have removed from the experimental group the two patients with PBD in whom breast cancer was detected during our study. We reported that, in one case, PBD was detected 1 year before the diagnosis of cancer and, in the other, the classification of PBD (on the basis of fine-needle aspirates) was made independent of the suspicion of cancer (as detected by mammography). Such individuals should be considered as affected with PBD in genetic and statistical analysis. These examples strengthen our contention that cytologic analysis can be an effective diagnostic tool in studies of genetic susceptibility to breast cancer. We used a one-tailed test of significance because our hypothesis stated that "PBD is more frequent in the clinically normal relatives of two closely related women with breast cancer than in controls." A two-tailed test, which would be appropriate for detecting positive or negative associations between PBD and breast cancer, also revealed a significant correlation ($P < 0.04$).

We would like to reemphasize that systematic sampling of the breast by fine-needle aspiration is strictly a research tool, and we discourage its use as a clinical screening method for asymptomatic women. We have no specific clinical recommendations to make to women who have histologically or cytologically defined PBD (*4*) other than to follow established screening guidelines.

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13 February 1991; accepted 17 June 1991

Critical Velocity of Stick-Slip Motion

In a recent report (*1*), we presented simulations of stick-slip motion in boundary lubrication. To mimic experiments (*2*), we considered a molecularly thin film confined between atomically flat, solid walls. A shear stress was applied to the top wall by attaching it, through a spring, to a stage translating at constant velocity. At high velocities, the top wall slid at a uniform rate. Below a critical velocity, ν_c, jerky motion occurred; the two walls alternately stuck together and slipped past each other. This "stick-slip" motion is a generic phenomenon observed in such disparate systems as squeaky hinges, milling machines, and violin bows (*3*). In this comment, we reconsider the factors which determine ν_c.

Our simulations showed that stick-slip motion in thin films resulted from transitions between ordered static and disordered sliding states of the film. For a film of simple spherical molecules, the two states were crystalline and fluid. The periodic potential of the static, solid walls crystallized the film at a temperature above the bulk melting temperature. Under a sufficiently large shear stress, this crystalline state became unstable and the film melted (*4*). The walls were then free to slip past each other and release the stress. When the stress in the molten film dropped below a critical value, there was spontaneous recrystallization. We found that ν_c coincided with the velocity of the wall just before recrystallization; the molten sliding state was unstable below this velocity.

An upper bound on ν_c is provided by the lattice constant of the wall divided by the relaxation time required for the film to order. The spherical molecules used in our simulation crystallized rapidly, and ν_c was about one-tenth the speed of sound. Critical velocities in experiments are roughly eight orders of magnitude smaller. Measured relaxation times in thin films are also six to eight orders of magnitude larger (*5*). We attributed both effects to the slowing of intramolecular dynamics in confined spaces and began studies of short chain molecules that had internal degrees of freedom (*6*). Unexpectedly, the values of ν_c did not decrease substantially with increasing chain length. While some relaxation times grew rapidly with chain length, locking of the films into a static glassy state only required rapid, monomer-scale rearrangements. The factors which determine the observed ν_c are entirely different from those that determine the longest relaxation times.

In order for the moving wall to stop, its kinetic energy must be converted into potential energy in the film. The maximum potential energy that can be stored in the film scales as the static frictional force (or yield stress), F_s, times the lattice constant of the wall, σ. Equating this to the kinetic energy at V_c, we find $\nu_c = c\sqrt{\sigma F_s/M}$, where c is a numerical factor and M is the mass of the moving wall. This mass was 14 orders of magnitude larger in experiments than in our simulations. We have completed new simulations which confirm that ν_c scales as $M^{-1/2}$ when other parameters are held fixed. The value of c varies from about 0.05 to 0.5, depending on load, commensurability of wall and fluid, and the crystalline alignment of the walls. The largest values of c were only found for epitaxial fluid densities and aligned walls. Neither condition is satisfied in typical experiments. Taking experimental values of $F_s \sim 20$mN, $\sigma \sim 5$Å, $M \sim 0.02$ kg, and $\nu_c \sim 2$ μm/s, we find $c \approx 0.1$. This is well within the range of theoretical values.

The other conclusions of our report (*1*) remain essentially unchanged. In particular, the stick-slip motion becomes irregular and intermittant as ν approaches ν_c. As ν increases, the degree of order required to absorb the kinetic energy increases, and it becomes increasingly unlikely that the film will achieve this degree of order and stick. These results and the changes introduced by molecular structure will be presented in a longer paper (*6*).

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7. Support from NSF grant DMR-8553271 and the Pittsburgh Suppercomputer Center is gratefully acknowledged. M.O.R. also acknowledges support from the Sloan Foundation.

16 May 1991; accepted 4 June 1991