THE SHEAR MODULUS OF PARTICLE-LADEN FOAM

ANDREW M. KRAYNIK*, SYLVIE COHEN-ADDAD † AND REINHARD HOHLER †

* Department 1514 MS0834
Sandia National Laboratories
Albuquerque, NM 87185-0834
amkrayn@sandia.gov

† Laboratoire de Physique des Materiaux Divises et des Interfaces
University of Marne-la-Vallee
Marne-la-Vallee cedex2, FRANCE

Recent experiments indicate that Gillette shaving cream becomes stiffer with the addition of solid particles that are comparable in size to the foam bubbles. We have used Surface Evolver [1] simulations to investigate this behavior. The solid particles are modeled as bubbles with higher surface tension than the foam; these particles approach spherical shape when the relative surface tension is large. We focus on situations where the particles and bubbles have equal volumes but also consider cases where the particles are different size. The foam structure is three-dimensional and ranges from ordered to random [2]. We find that the shear modulus of foam increases as the concentration and surface tension of the particles increases. The results are compared with theory.

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References

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