Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Acoustic Properties of Dilute Microstructured Suspensions: Theory and Experiment WUHAN YUAN, LIPING LIU, JERRY SHAN, Rutgers University — It is known that the orientation of ellipsoidal ferromagnetic particles in suspensions can be readily manipulated by external magnetic fields. This variable suspension microstructure can lead to a novel acoustic medium with tunable sound speed and attenuation. In pursuit of a better understanding of the acoustic properties of such microstructured suspensions, we develop a theoretical model for the effective viscosity of suspensions of oriented ellipsoidal particles. We then use this model to predict the acoustic properties of the suspensions, and how they depend upon sound frequency and particle volume fraction, aspect ratio, and orientation. On the other hand, we also conduct a series of experiments measuring sound speed and attenuation in suspensions of nickel microflakes with and without microstructure induced by external magnetic fields. The experimental and theoretical results are presented and compared.

Jerry Shan
Rutgers University

Date submitted: 02 Aug 2013 Electronic form version 1.4