Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Phonon thermal conductivity of a nanowire attached to leads
SELMAN HERSHFIELD, KHANDKER MUTTALIB, Department of Physics, University of Florida — There is experimental evidence as well as theoretical proposals that nanowires can be made to have high thermoelectric efficiency by tuning the electronic properties; however, there is always a phonon contribution to the heat transport which reduces the thermoelectric efficiency. In the harmonic approximation we compute the transmission of phonons through a nanowire coupled to large leads. There is a finite thermal conductivity because of the restriction provided by the nanowire. The nanowire reduces the thermal transport because of the mismatch between the leads and wire modes. We examine the effect of disorder in three places: in the wire, in the leads near the wire, and in the leads far way from the wire. In some cases disorder can increase the thermal conduction because of enhanced mode coupling. We will discuss the implications of our results for thermoelectric nanowire devices.

Selman Hershfield
Department of Physics, University of Florida

Date submitted: 14 Nov 2014 Electronic form version 1.4