











Atomistic Investigation of Phonon Wave Transport Through Embedded Nanoparticles Theodore Maranets and Yan Wang, Ph. D

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Conclusions

Phonon scattering expectedly varies with γ , however, deviation in reflection/transmission behavior between the NP and TS is observed, contradicting continuum analyses.

Characteristics of phonon scattering by NP are consequence of an unreported phonon lensing effect, where refraction of the phonon wave at the nonplanar interfaces modifies the wave dynamics.

Qualitatively, the lensing structure is mostly specular at low γ and more diffuse at higher values. The degree of specularity appears to impact the state of interference inside the NP.

Future work involves quantifying important scattering properties like scattering cross-sections & phase functions as well as specularity parameters.

Novel insights on the impact of NPs on phonon wave dynamics have large implications on design of NPladen TEMs. Knowledge of how scattering varies with NP size, which is elucidated by this research, may lead to development of <u>an optimal NP size design</u> structure for improved thermo-electric performance, beneficial for many NASA applications.

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