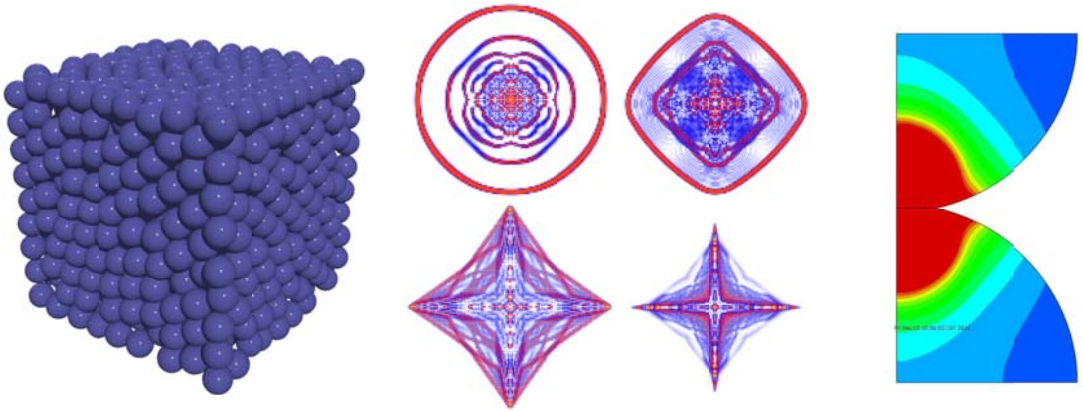
Project Title: Computational Analysis and Design of New Class of Wave Tailoring Materials

Adviser: Prof. Philippe H. Geubelle (AE)

Project Description

Granular materials are a new class of materials being investigated for use in wave tailored packaging. These applications are envisioned to safeguard damage, e.g., for electronic components in devices against accidental impacts, engineering structures against earthquakes and soldier body armor against sudden pressure fluctuations. Central to the homogenized material behavior in granular media is the nonlinear interaction between individual granules in contact. Granular media with elastic properties support several modes of wave propagation (as shown in Figure 1b), ranging from homogeneous solitary wave propagation to directional propagation. The focus of the present research will be to investigate wave propagation in granular systems by incorporating plasticity and randomness. These systems exhibit additional phenomena such as dissipation, attenuation and dispersion which may lead to novel material behavior. You will get experience with scientific research in the discipline of material design and gain the opportunity to get training on the molecular dynamics solver LAMMPS and the finite element analysis software Abaqus.



(a) (b)

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Student background and expected research activities:

We are looking for **two** enthusiastic and motivated students who have interest in computational mechanics and possess basic programming skills. Previous knowledge of molecular dynamics or finite element analysis is not required. The students will perform simulations using LAMMPS and/or Abaqus to investigate the static and dynamic response of these novel granular materials.

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