Granular crystals are composed of ordered elastic particles in periodic architectures, which exhibit remarkable versatility in their acoustic spectra from linear to highly nonlinear regimes. Dr. Yang’s research focus resides in the development of tunable and lightweight structural materials based on granular crystals to identify external impacts and mitigate noise and vibration in a selected range of frequencies. These novel acoustic structures are feasible by exploiting dispersion and nonlinearity effects resulting from the close interplay among granular particles. Such material systems could be used for several engineering applications, including self-sensing and protective structures and tunable acoustic filtering devices. Dr. Yang is also interested in the design of new sensor and actuator instruments based on nonlinear solitary waves in granular crystals. Preliminary studies show that these sensors can successfully characterize bone mechanical properties for biomedical applications and detect hidden delaminations and cracks in military structures for aerospace applications. These novel sensor devices may offer a new perspective beyond the conventional linear-wave based structural health monitoring and nondestructive evaluation schemes.

Short bio:
Jinkyu Yang is an assistant professor in mechanical engineering department at the University of South Carolina. His research interests encompass advanced structures/materials development, mechanics of nonlinear media, and SHM/NDE. He worked as a postdoctoral research scholar in the Graduate Aerospace Laboratories of the California Institute of Technology (GALCIT) between 2009 and 2011. Before joining Caltech, Dr. Yang worked as a senior engineer at Samsung Electronics. Dr. Yang received master’s and doctoral degrees in Aeronautics and Astronautics at Stanford University in 2001 and 2005, respectively.