

Abstract Submitted  
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**Nonlinear acoustics of glass bead packings at vanishing static pressures**<sup>1</sup> VINCENT TOURNAT, LAUM, CNRS, Université du Maine, Le Mans, France, VITALYI GUSEV, LPEC, CNRS, Université du Maine, Le Mans, France — We present here a set of recent results obtained in three experimental configurations: linear and nonlinear acoustic probing of a granular slab at different compacities, surface acoustic waves in granular layers submitted to gravity, resonances of a granular layer with an in-depth elasticity gradient. We succeeded to overcome the experimental issues associated to the dramatic increase of acoustic wave attenuation when the confining pressure diminishes. Interpretations reveal that the manifestations of nonlinear effects (self-demodulation, nonlinear resonance, second harmonic or subharmonic generation...) allow to isolate the different types of nonlinearities involved (Hertz, clapping, stick-slip, hysteresis...). Also, some discrepancies are observed for the extracted linear elastic parameters scaling laws as a function of vanishing pressure (lower than 100 Pa typically) between the different developed experimental configurations and the theoretical predictions. Explanations for these discrepancies are given. We show than under some conditions, it is necessary to take into account the coupling of grain motion with that of the saturating air. Application of these results to the probing of granular layers under destabilization will be presented.

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