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Acoustic emission before avalanches in granular media

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Avalanches of granular media are mainly characterized by the observation and the measurement of the main angles of avalanche corresponding first to the movement of isolated beads and to the whole movement of a great part of the grains. These characterisations do not give any information about the rearrangements of the grains inside the layer of granular beads. As any movement of a grain produces a deformation of the structure it is quite normal to expect for a sound that will propagate inside the granular medium. We present an experimental study of the precursors of avalanches on spherical granular glass beads and silica aerogels in powder (size of grains less than 80 micrometers). Acoustic emission has been recorded with two piezoelectric transducers placed on the lower part of the material layer. Our results show clearly that before any movement on the upper part of the beads layer, so for an angle less than the first angle of avalanche, movements inside the material produce pulsed sounds that can be recorded. These vibrating events are more and more occurring when the angle is increasing till the first angle of avalanche where acoustic emission becomes intense.