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### Acoustic transmission through one plane of bubbles

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We measured the transmission of ultrasonic waves through one layer of bubbles, for frequencies ranging from 30 to 250 kHz. The layer was a true 2D structure obtained by injecting very monodisperse bubbles (with radius  $r=100\ \mu\text{m}$ ) into a yield-stress polymer gel. Even for layer with a low concentration of bubbles (areal fraction,  $n\pi r^2$ , of 10-20%, where  $n$  is the number of bubbles per unit area), the transmission was found to be significantly reduced by the presence of bubbles (-20 to -50 dB) and showed a sharp minimum at a particular frequency. Interestingly, this frequency did not correspond to the individual Minnaert resonance of the bubbles, but depended on the concentration, which we interpret as an indication of strong coupling between the bubbles. We propose a simple model, based on a self-consistent relation, which takes into account the coupling between the bubbles and gives good agreement with the measured transmission.