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High frequency ultrasonic waves in metals and dielectrics

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We theoretically study the generation of high frequency ultrasonic waves by short laser pulses, as well as their propagation, in metals and dielectrics. For this purpose, we employ a theoretical model that applies to both cases of materials. In the case of the dielectric the theoretical model is reduced properly. We compute key physical quantities of the lattice deformation such as the temperature, the strain and the displacement of the bulk while we compare the obtained results for the two different abovementioned types of materials. The dependence of these quantities on the generating laser intensity and pulse duration is investigated, revealing interesting differences in their behavior.