

## Theoretical Study of Laser-generated Rayleigh Waves

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### Abstract

We discuss the generation of the surface waves from the mode conversion occurred at the boundary due to the reflection processes of the ultrasonic waves. The speed and the surface motion of the material element are investigated from the solution of the Rayleigh equation. We present the results obtained from the numerical computations based on the theories. The Rayleigh waves generated by the irradiation of the pulsed laser beam in the thermoelastic region and the ablation region are discussed.

### Figures

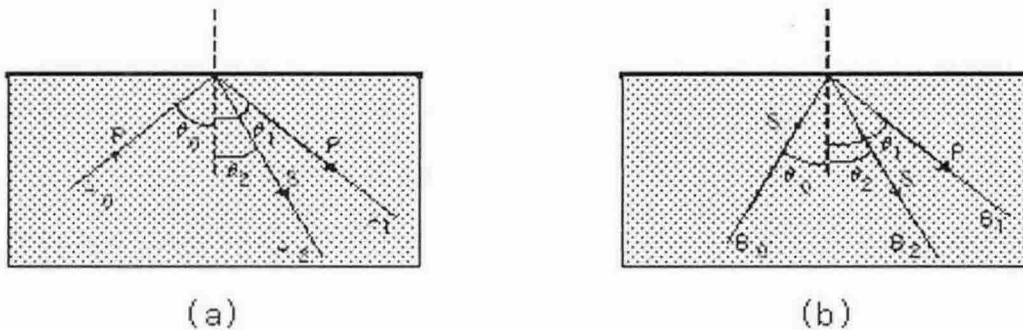


Figure 1. Schematics of the mode conversions due to the reflection of the ultrasonic waves occurred at the boundary; (a) reflection of the compressional ( $P$ ) wave, (b) reflection of the shear wave( $S$ ) at the surface.

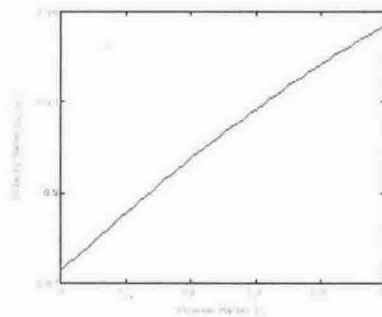


Figure 2. Rayleigh surface wave speed vs. the Poisson ratio.

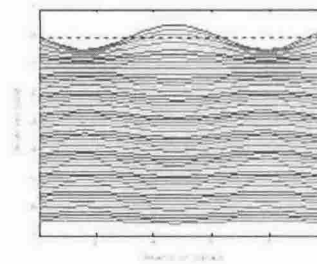


Figure 3. Particle displacement parallel to the surface vs. the depth.

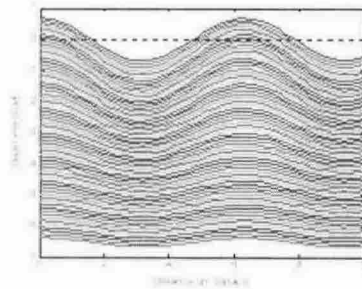


Figure 4. Particle displacement normal to the surface vs. the depth.

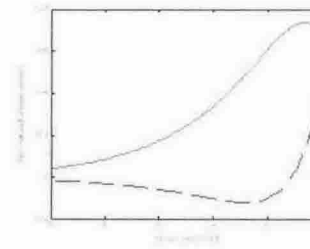


Figure 5. Normalized displacement of the particle vs. the depth.

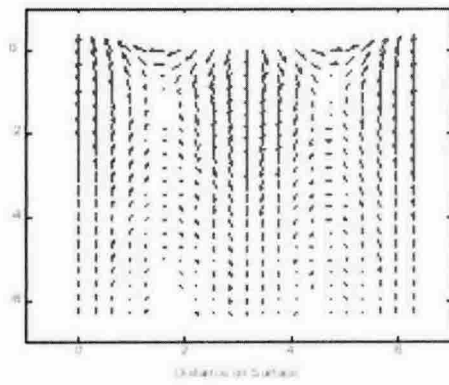


Figure 6. Vector field representation of the displacement of the particle.

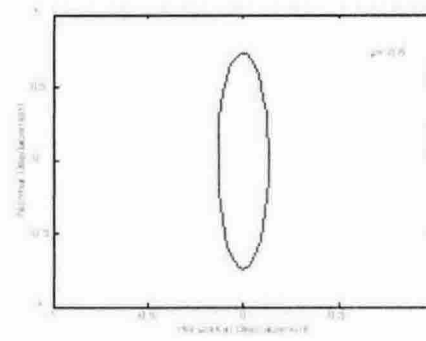


Figure 7. Particle displacement as a function of time.

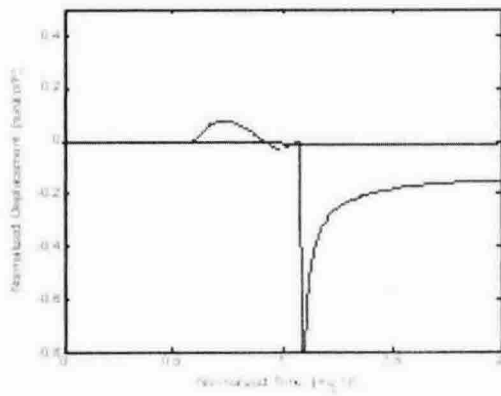


Figure 8. Normalized vertical displacement generated by tangential forces.

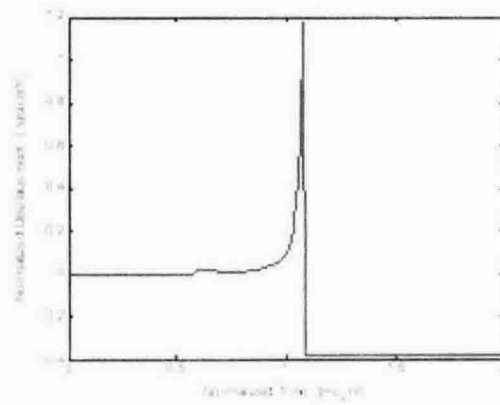


Figure 9. Normalized vertical displacement generated by normal forces.