Stiffness Identification in Biological Tissue

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By cross-correlating successive ultrasonic scans of the biological tissue that is excited by a transient source on the surface, recent experiments show that the wave displacement during the interval between the two scans can be measured everywhere in the tissue. Assumming we know the displacement history of the shear wave everywhere, we identify the stiffness change inside the tissue in terms of the Lamé constant, μ. Our method starts with the asymptotic expansion of geometrical optics. By tracing the amplitude change of the displacement along the gemoetrical rays as they travel into the medium, we are able to recover μ without directly taking derivatives of the displacement data.