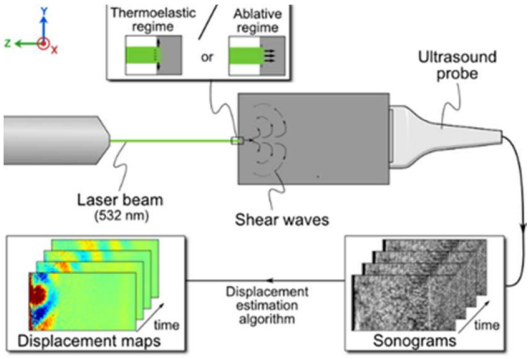
New shear wave induction techniques in dynamic elastography



When a doctor suspects a disease in a patient, one of his first examinations is often manually palpate the concerned organ. But for about 15 years, the elasticity of a member can be measured much more accurately through a technique called dynamic elastography. Dynamic elastography is composed of three elements: the induction of a displacement in a body, the observation of the propagation of this displacement, and the calculation of elasticity from observations. Displacement is usually induced by a single shaker or speaker, positioned on the surface of the skin near the area to be observed, or using acoustic waves. This displacement can then propagate in the form of a particular wave called shear wave. The harder the biological tissue, the faster is this wave. Thus, one can produce an elasticity image of the organ by measuring the velocity of the shear wave in each location. This wave is usually observed by ultrasound or magnetic resonance imaging (MRI): according to the modality, algorithms exist to follow the movements.

Our lab current research focuses on alternative induction techniques of the elastography initial displacement. We proposed to induce it by Lorentz force, ie by combining an electric current and a magnetic field. The advantage is that the movement can be induced remotely, without contact: this can be useful for some difficult access organs like the brain, protected by the skull. To induce the movement, we have also shown that one can use a laser beam. This allows for timely and miniaturized source to induce shear waves.