## US waves propagation in an elastic medium: 2D Finite Element Modelling

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## Objectives

In this study, we develop a simulation tool, in the framework of finite element method, to provide additional support of the ultrasonic wave characterization technic. In this technic, the speed and attenuation of an ultrasound pulse are correlated to the microstructure parameters such as grain size, phase fraction or recrystallized fraction.

Experimentally, the geometry and/or the correlated effects of different microstructural features evolution make the analysis tricky. The model developed here help to decorrelate these effects thanks to the independent control of each parameter. It is also used to study the effect of damage evolution or fraction of particles in a matrix on the speed and attenuation of a pulse.

Dynamic explicit analysis	<u>At each node:</u>	$\mathbf{\ddot{u}}^{(i)} = \mathbf{M}^{-1} \cdot (\mathbf{F}^{(i)} - \mathbf{I}^{(i)})$
element		



Average grain size 50 µm, voronoi tesselation:

