

# Investigation on Feature Guided Waves

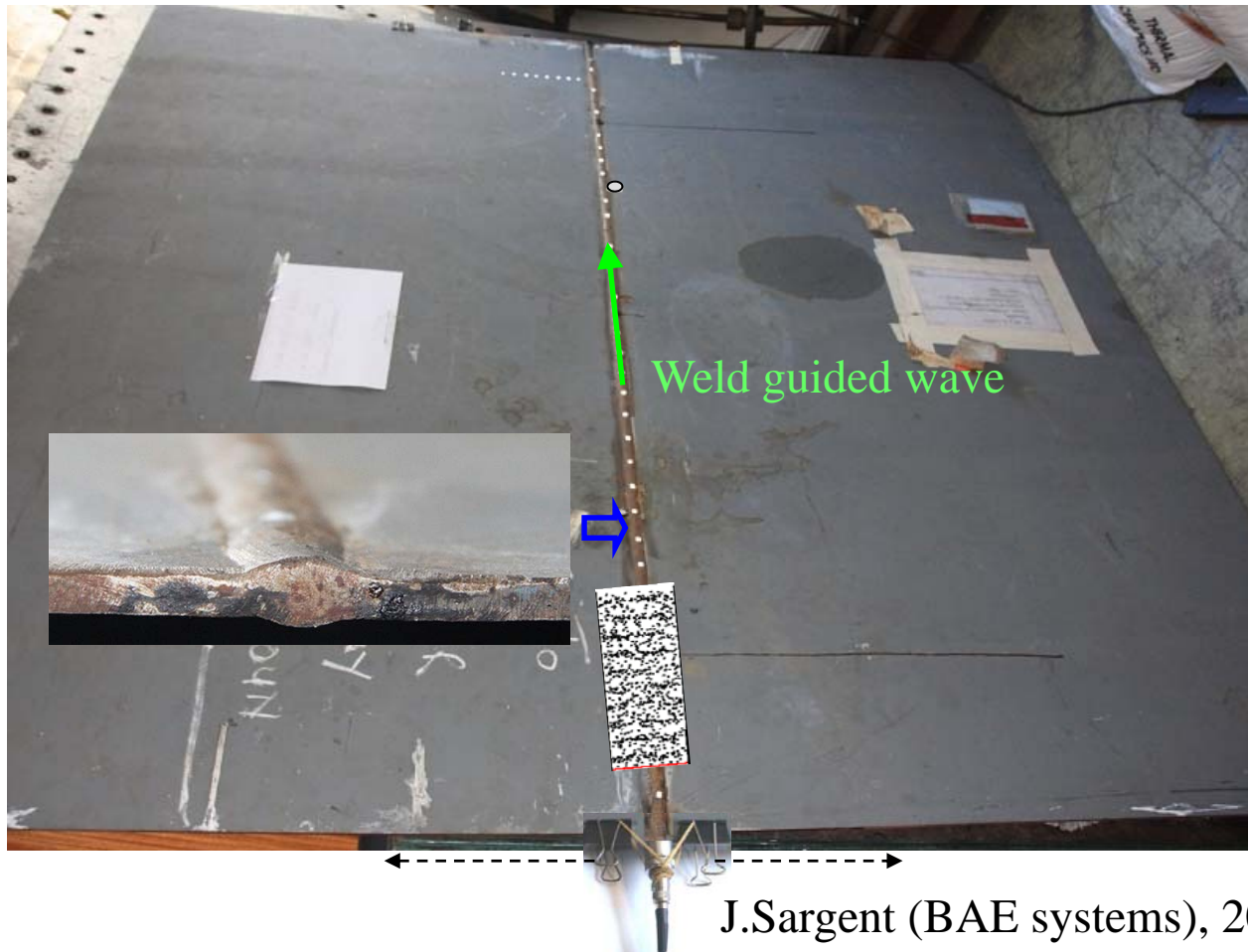
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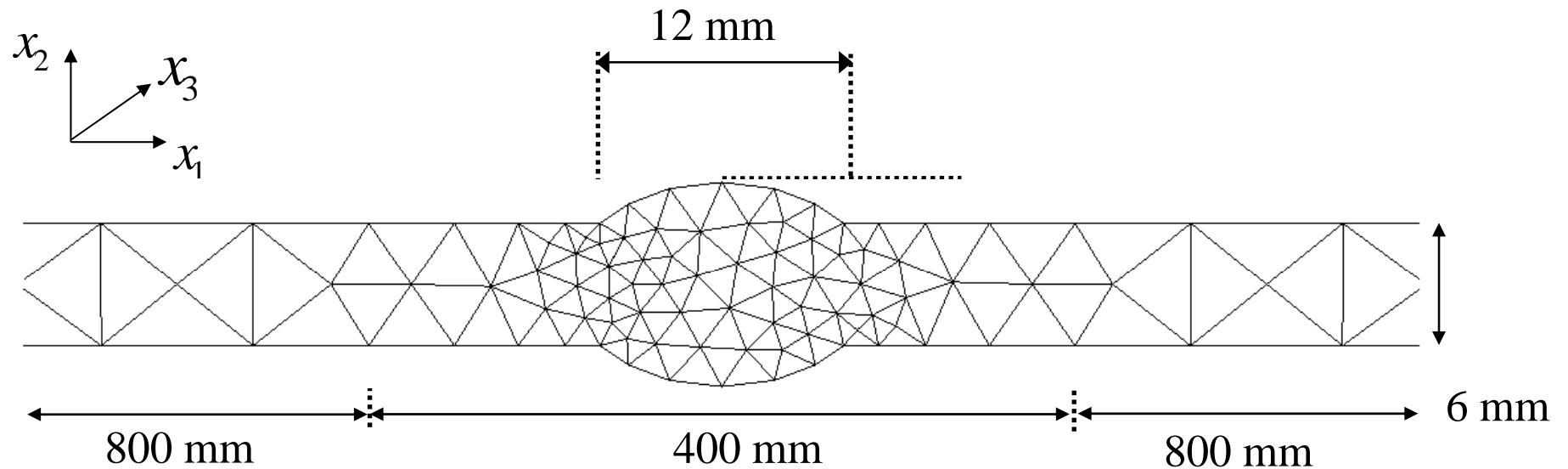
- Large area inspection by guided wave

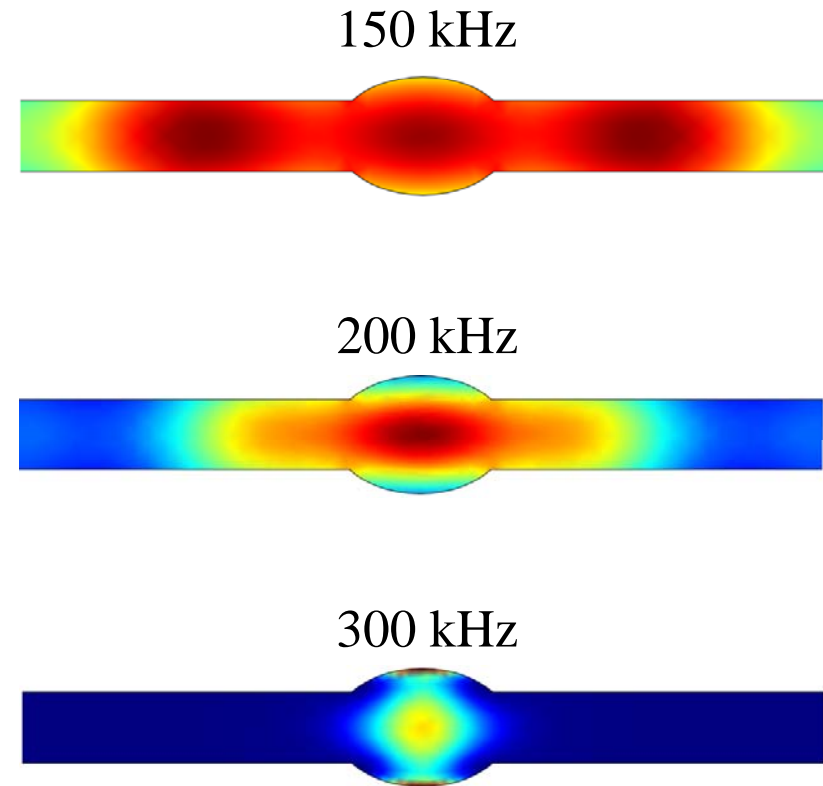
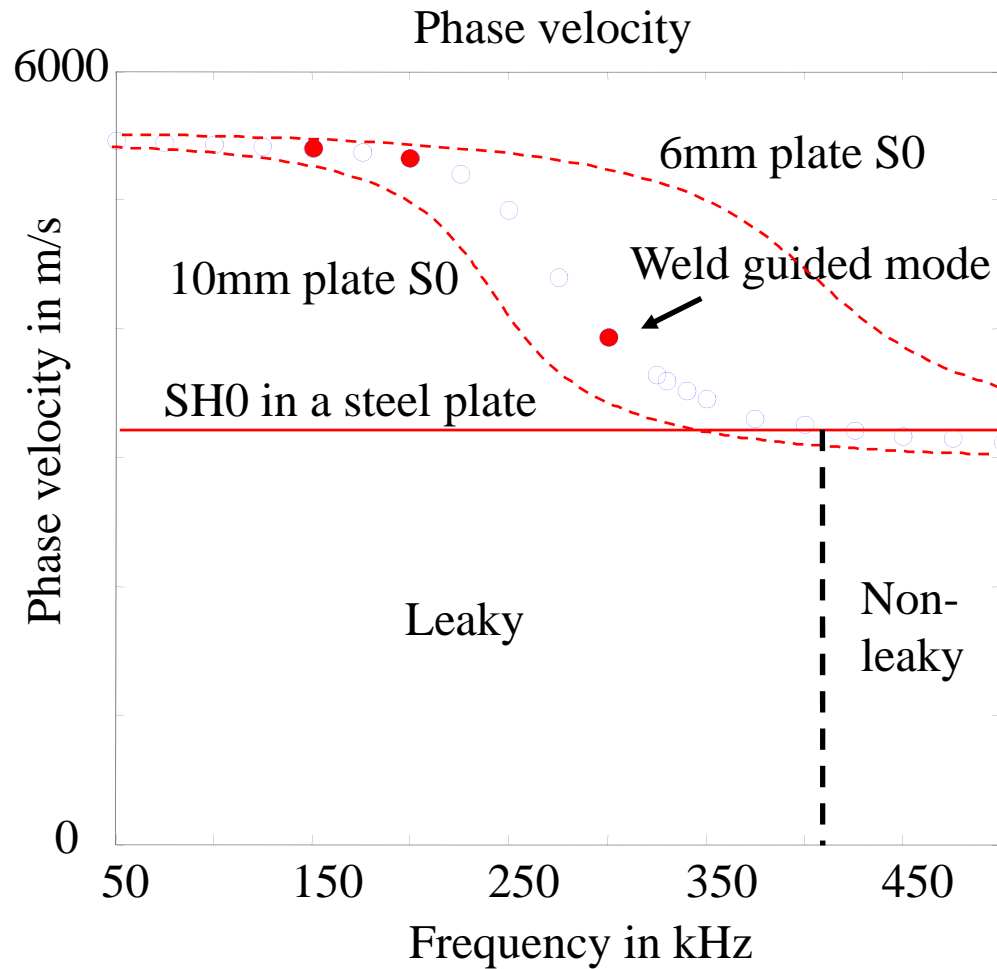


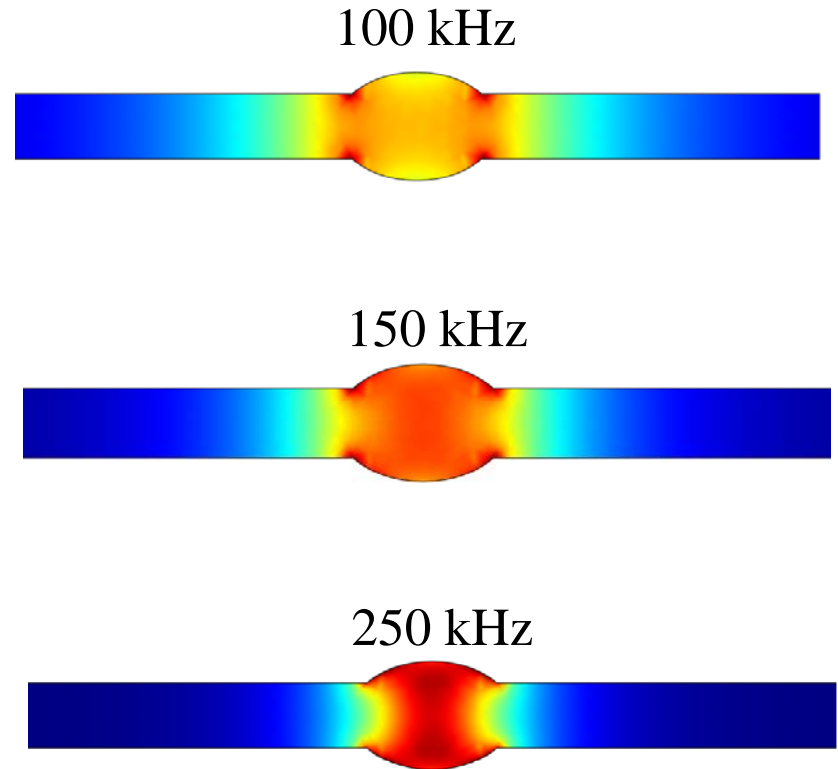
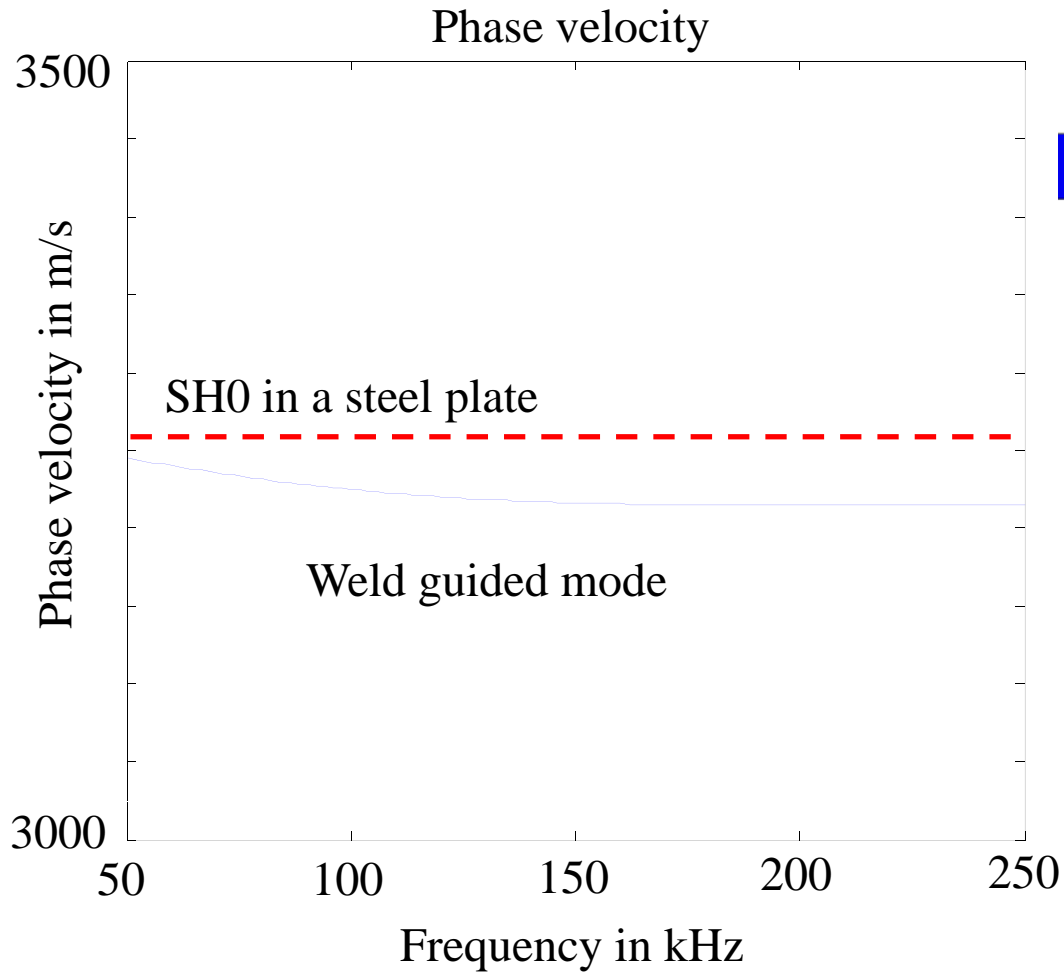
- Inspection of plate with weld



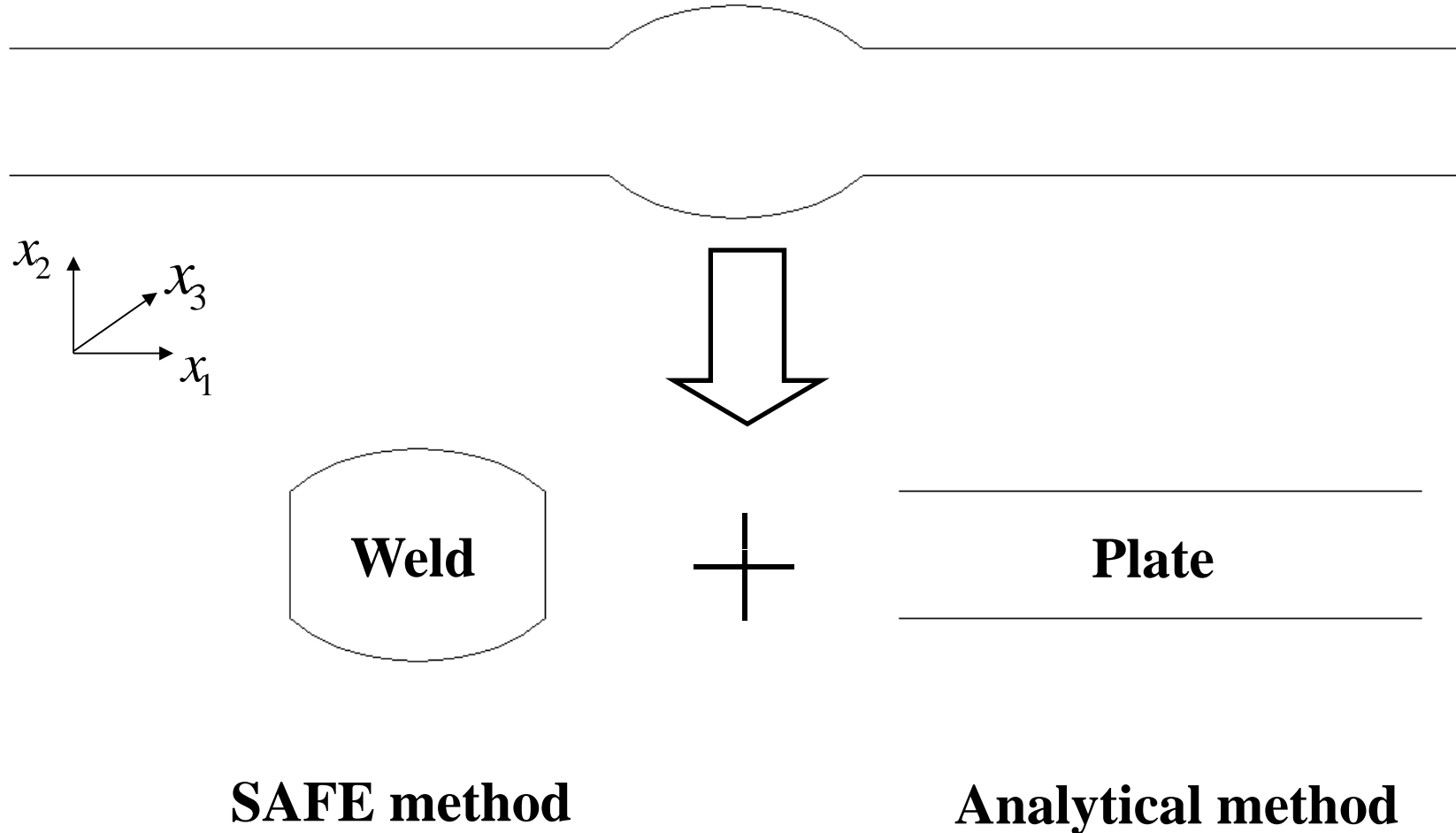
Semi-Analytical Finite Element (SAFE) method:



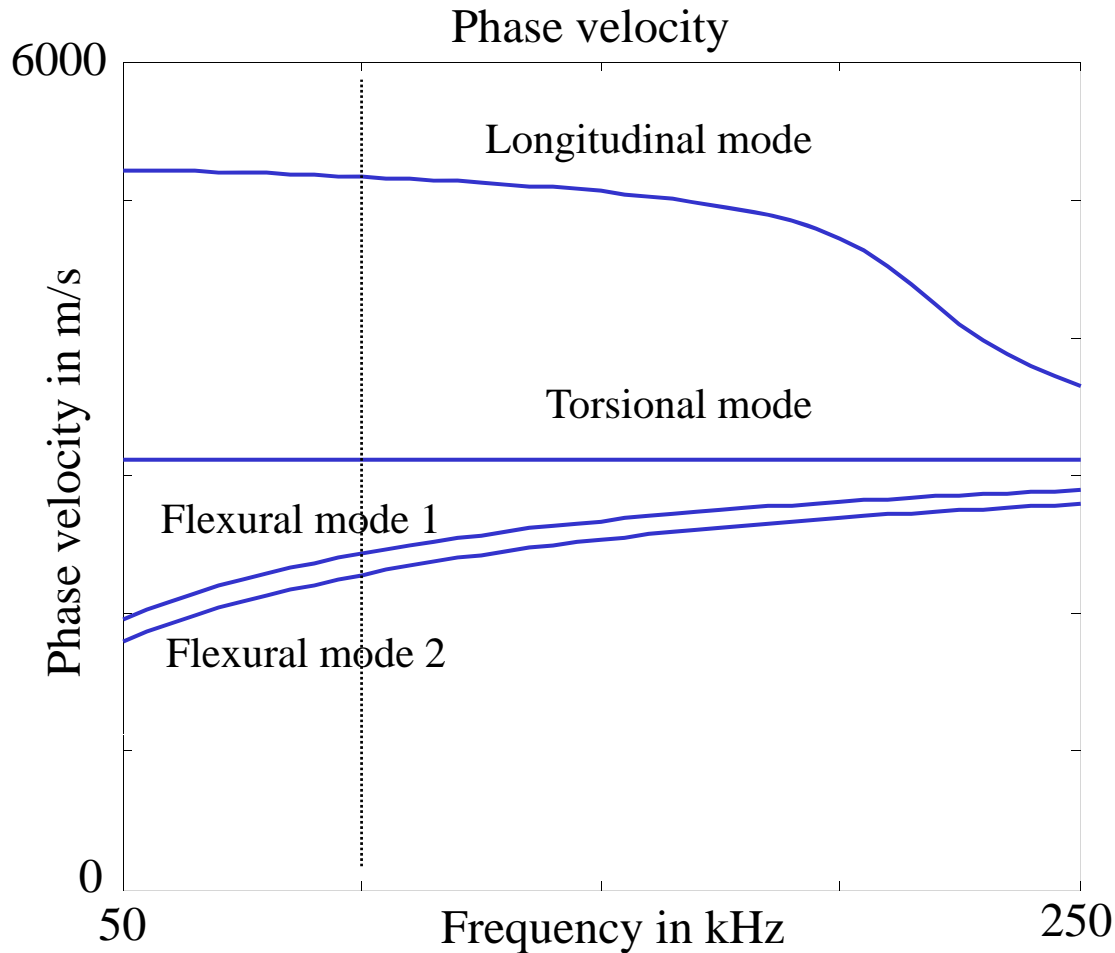




Fan & Lowe  
Proc. R. Soc. A, 2009



- Condition 1: Similar mode shape

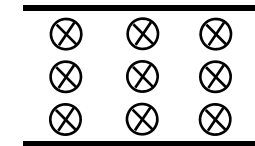
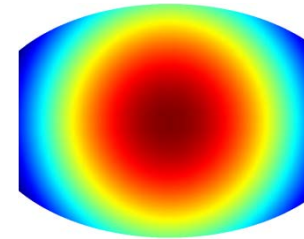


Weld cap

Plate

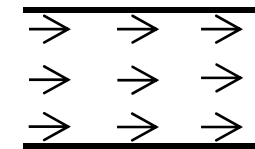
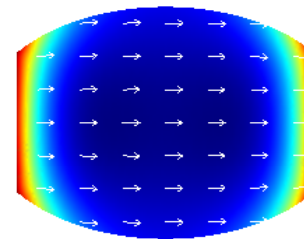
L mode

S0 mode



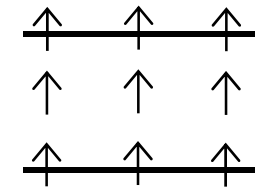
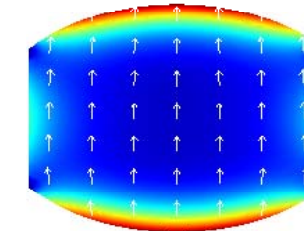
F mode 1

SH0 mode



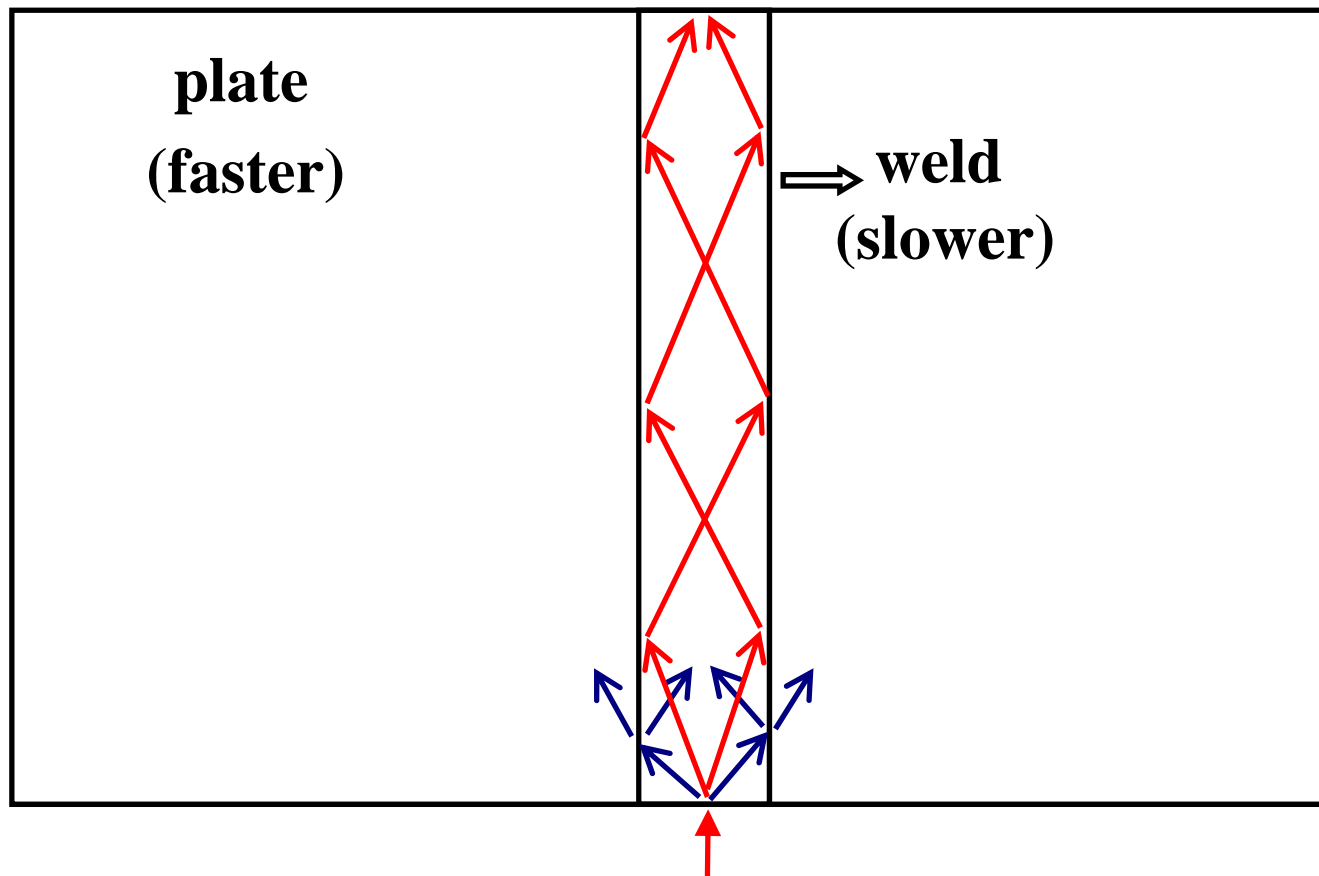
F mode 2

A0 mode

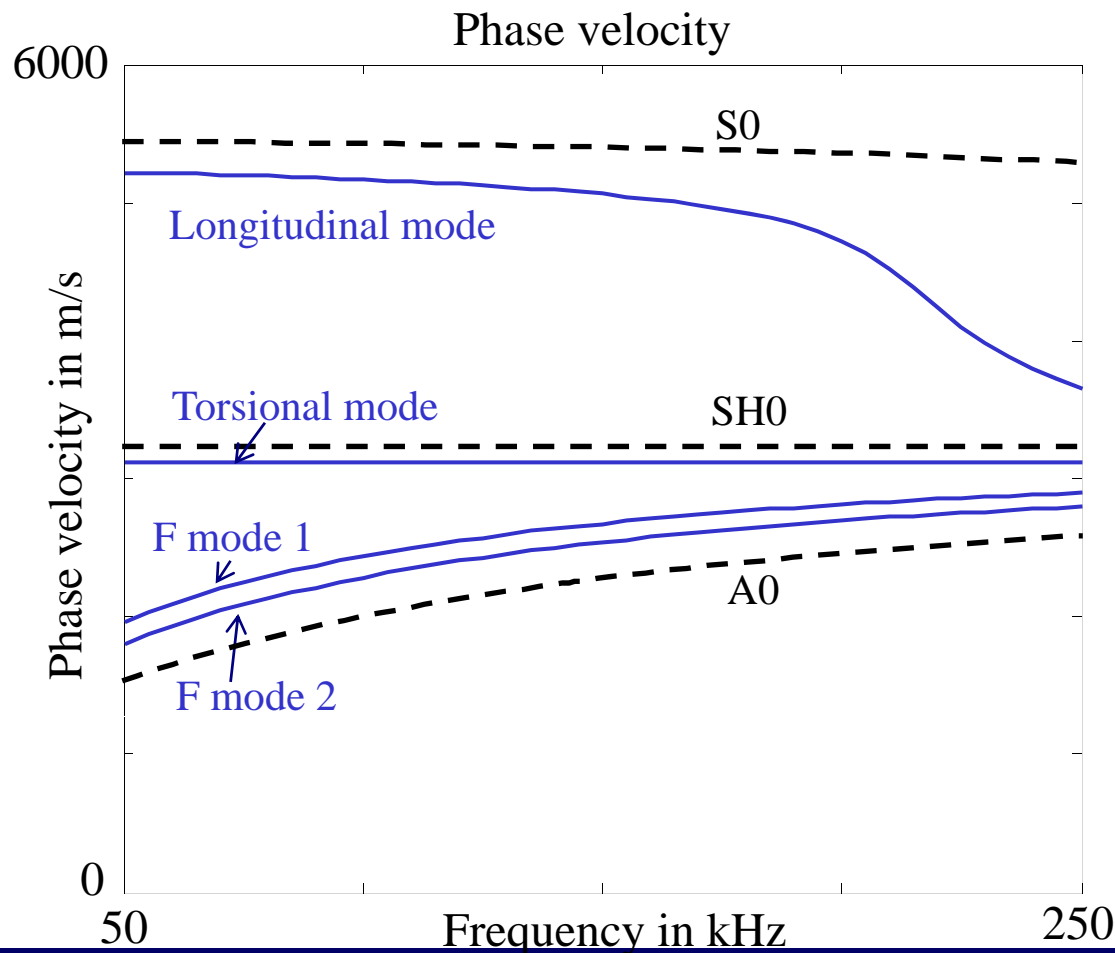




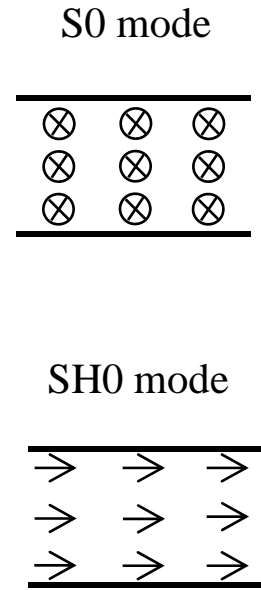
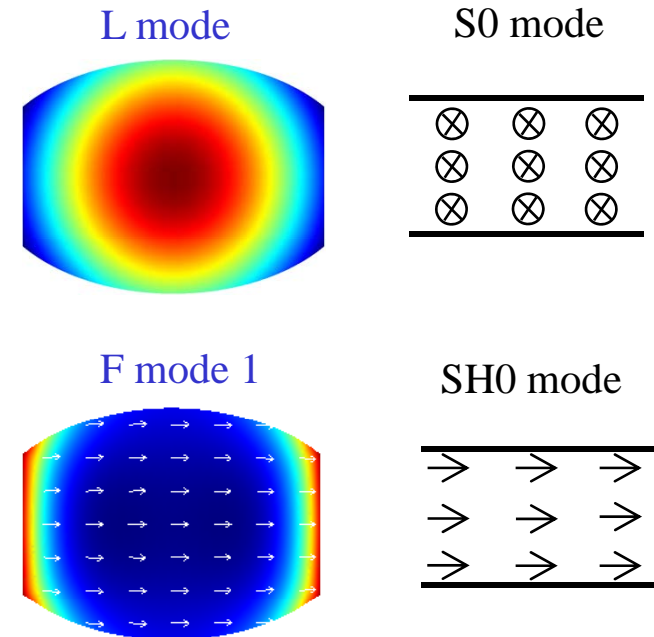
- Condition 2: Lower velocity in the weld



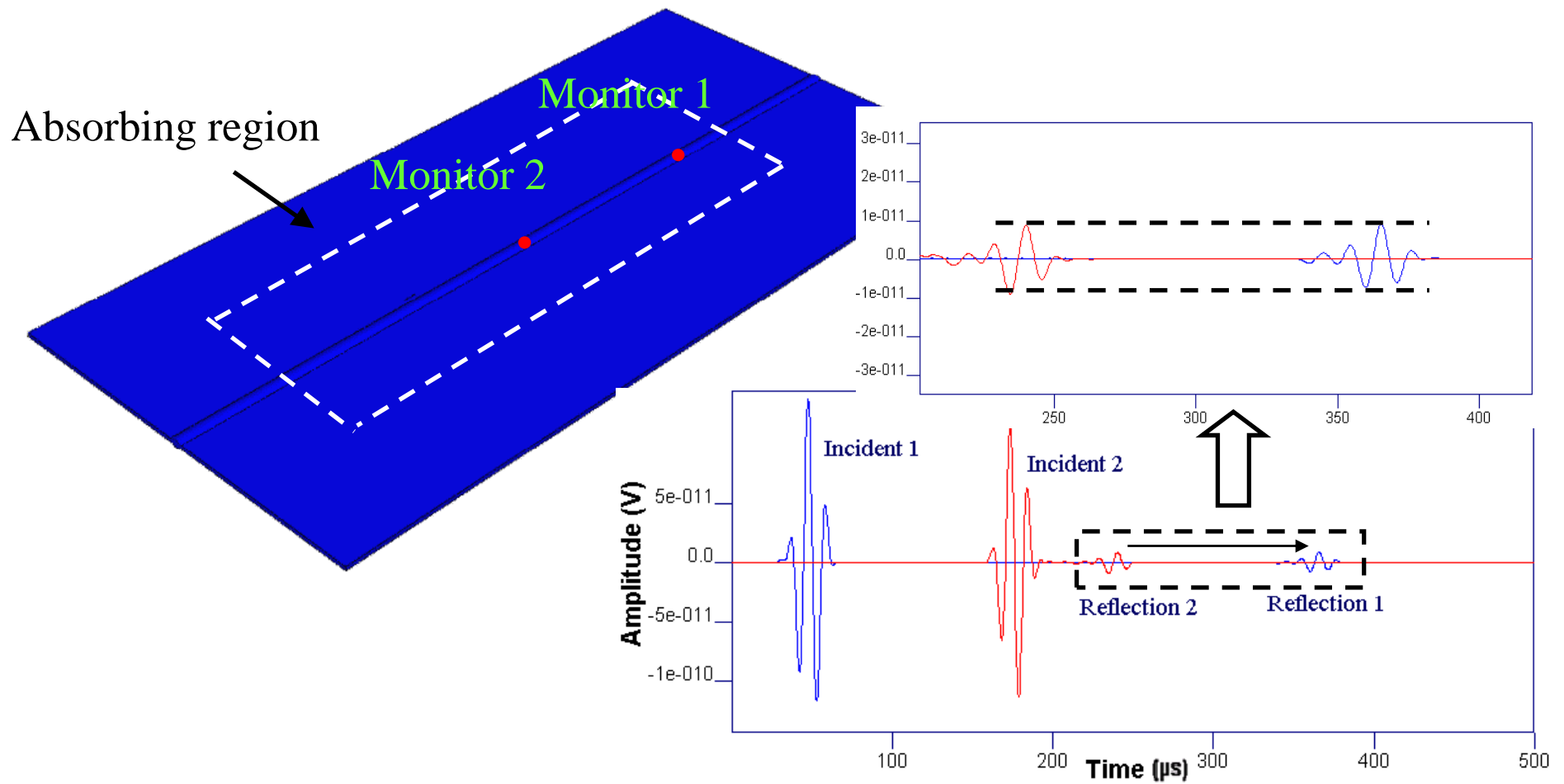
- Condition 2: Lower velocity in the weld

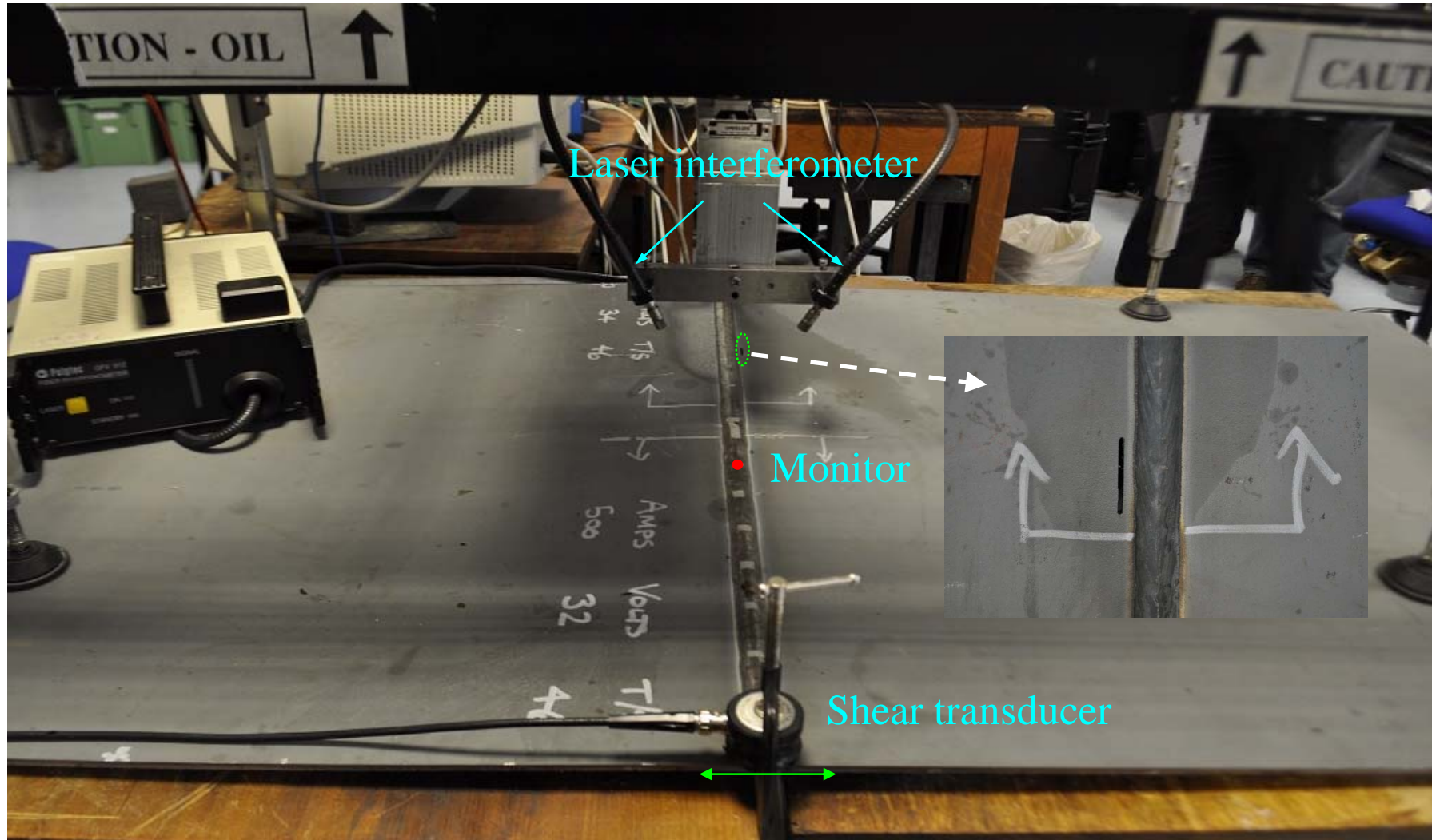


Trapped modes:

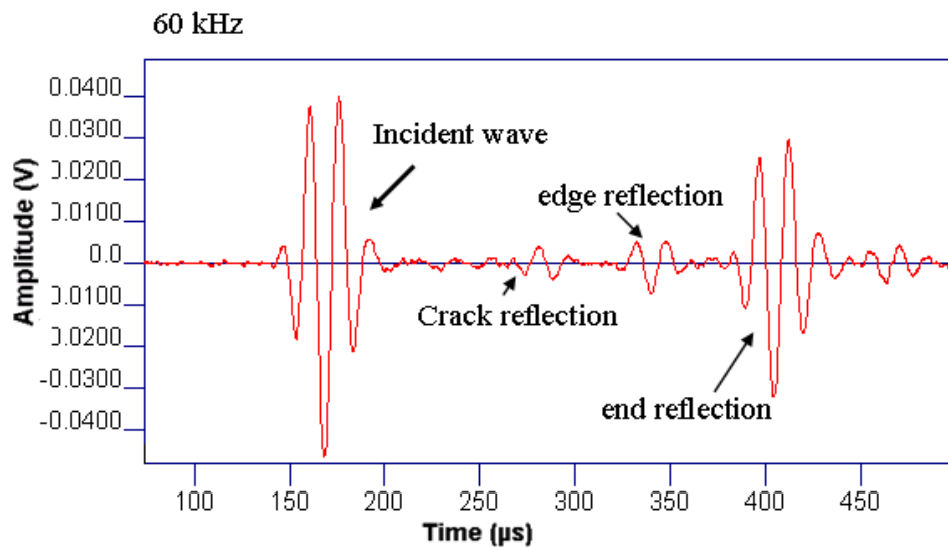
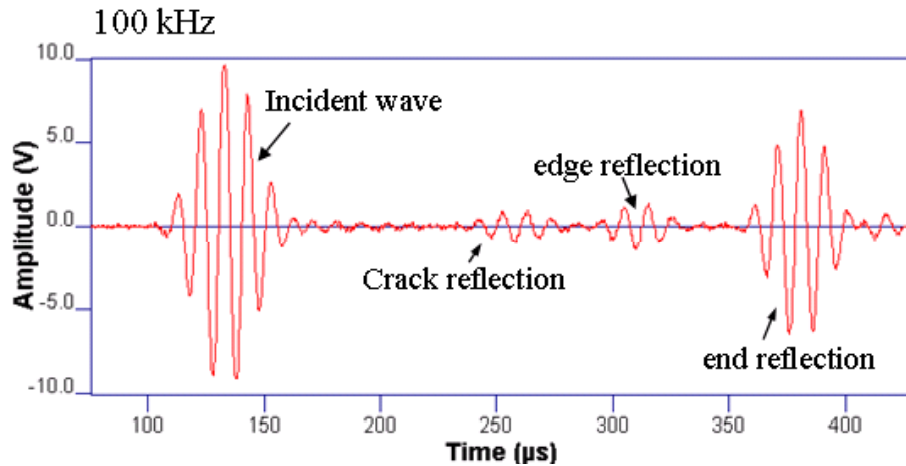


Exciting mode for inspection

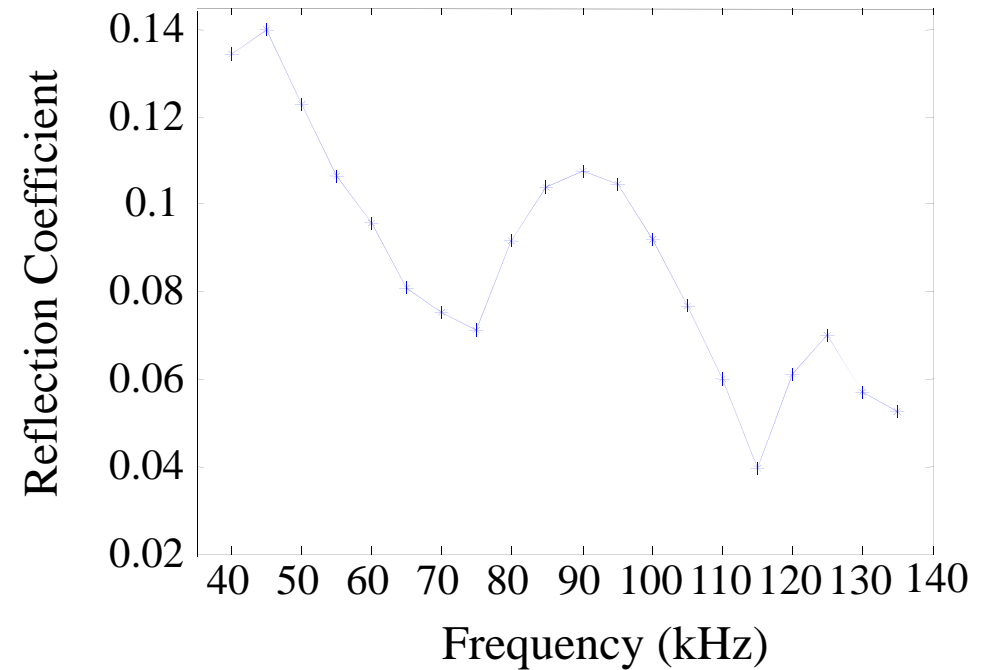




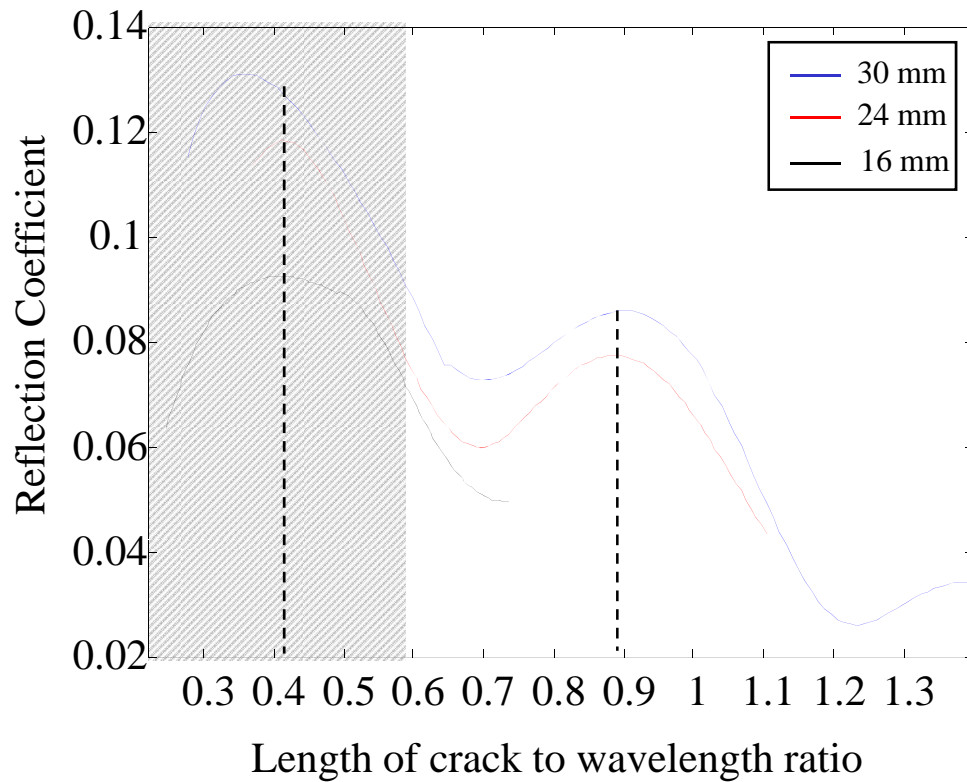
30mm slot parallel to the weld



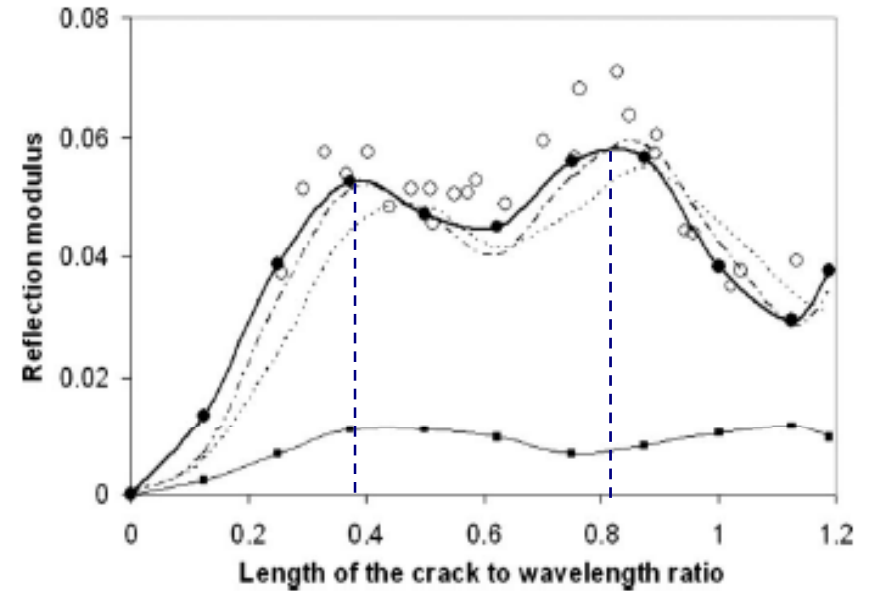
30mm slot parallel to the weld

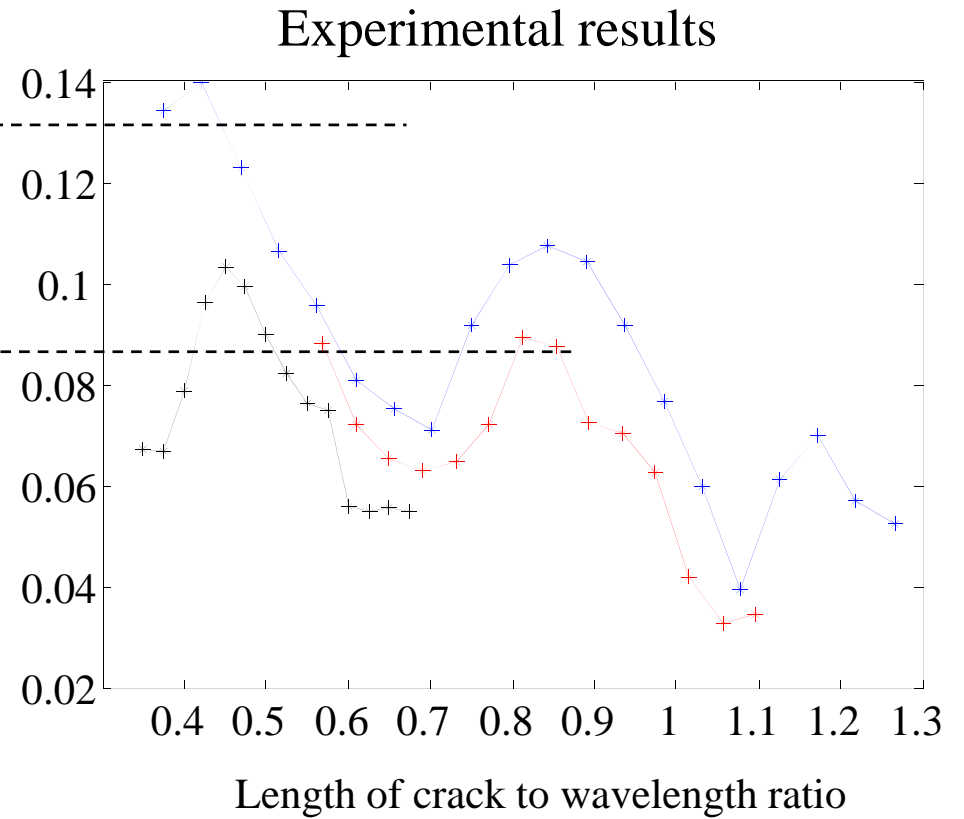
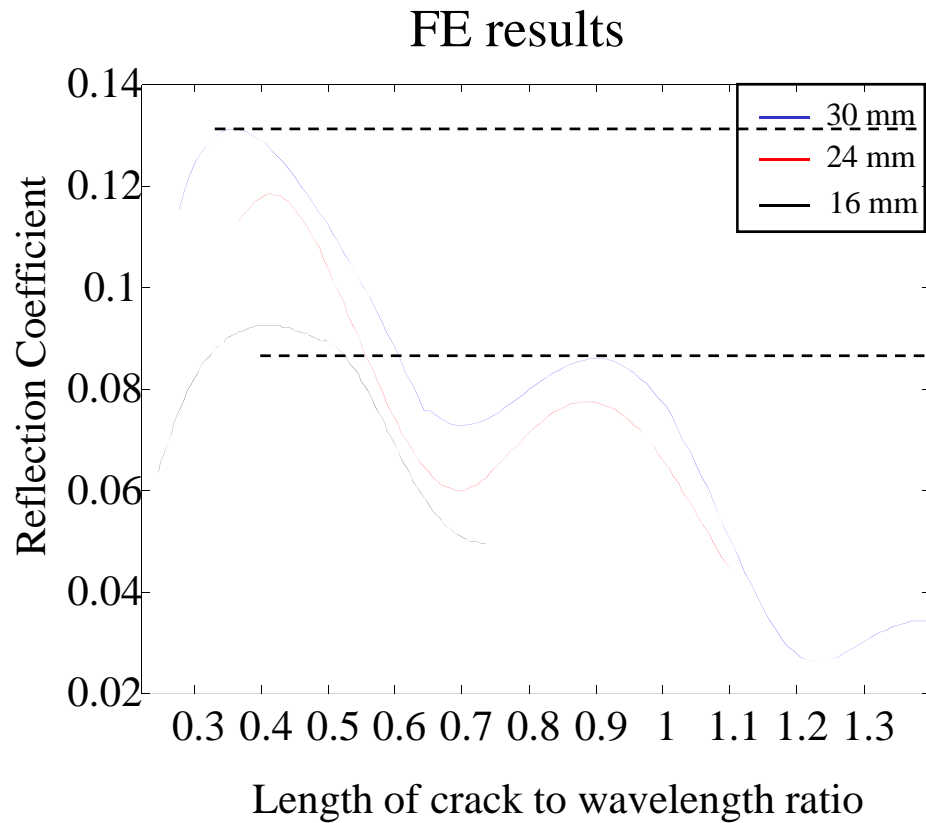


Different length of the crack:

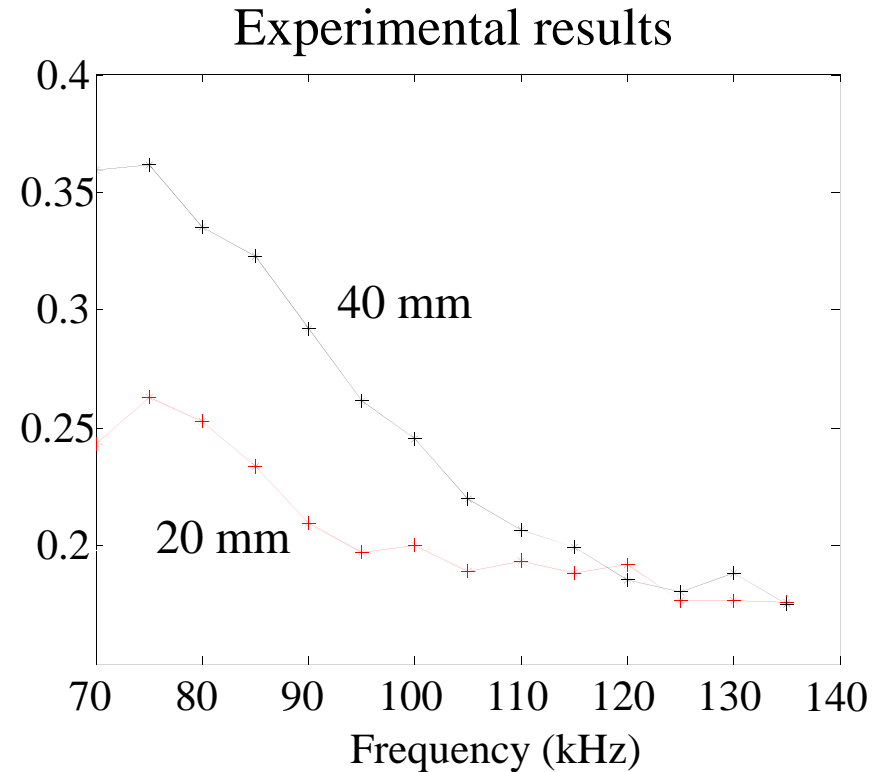
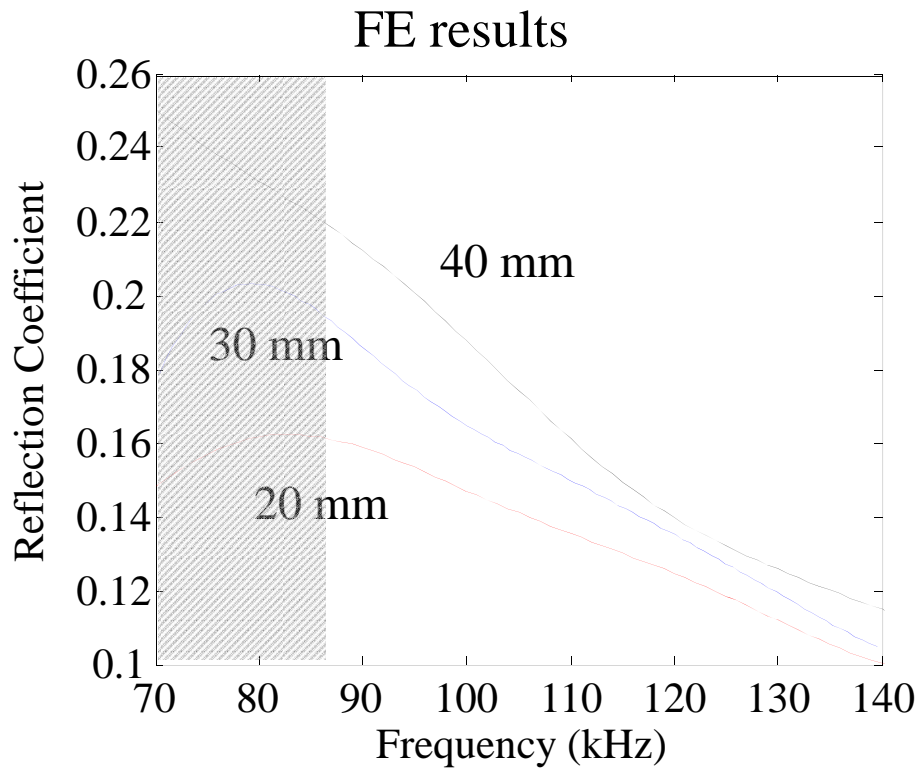


SH0 wave interaction with axial crack on a plate





Possible reason: difference between the milled slot (experiment) and the FE crack

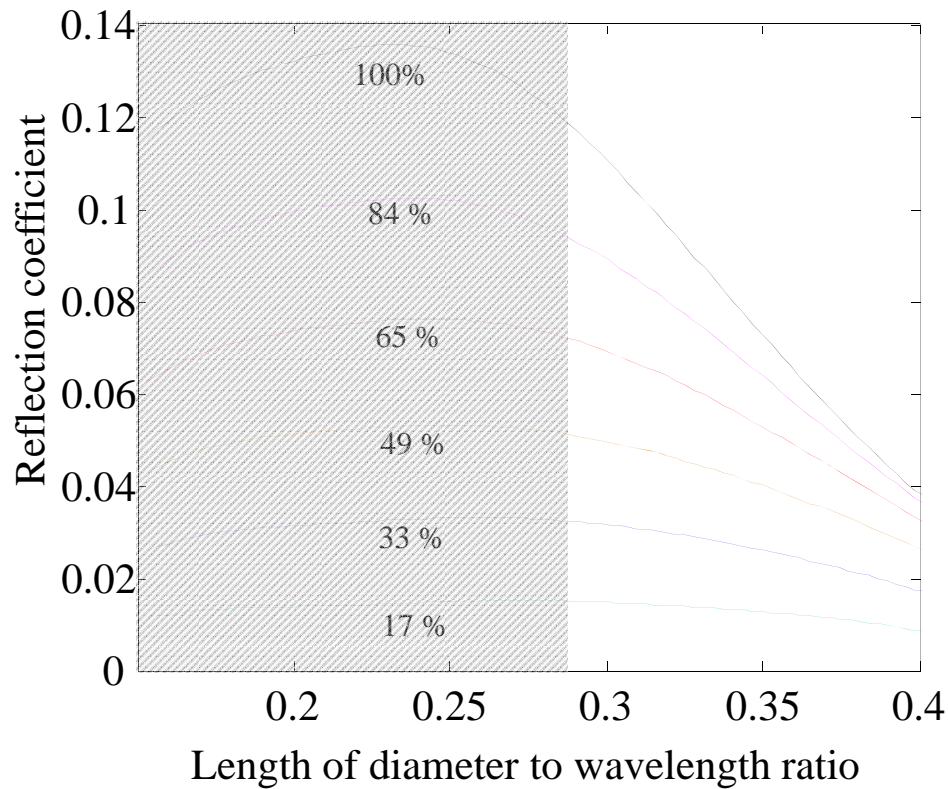


Possible reason: un-uniform of the weld geometry

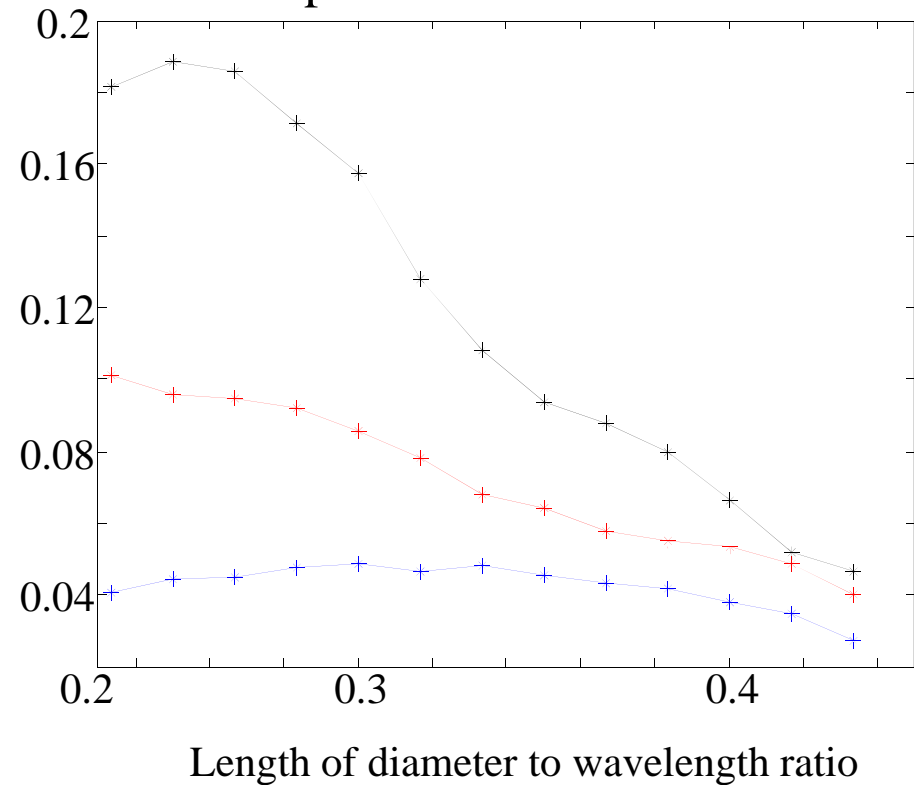


Different depth of the hole:

FE results



Experimental results



- The feature guided wave has been studied by the SAFE method. Both the compression mode and the shear mode have been investigated and compared.
- The reason for the trapping effect has been discussed and summarized.
- Experiments have been taken to validate the existence of the trapping mode and its sensitivity to certain defects