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Wavefront Synthesis in a Reverberation Chamber: Experimental Results

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The TREC recipe in a nutshell: a) a weakly lossy diffusive environment (e.g., a reverberation chamber), b) a single source, with no special features and c) a scanning system for sampling Green's functions over a surface.



Fig. 1 : The robot optimized to weakly perturbate a reverberation chamber in the GHz range. On the right, a detail showing the electro-optic probe.

First automated validation. Goals: a) to assess how strongly the generated wavefronts contrast with the diffusive background, b) their reproductibility and c) their ability to generate spatially resolved EM stress.

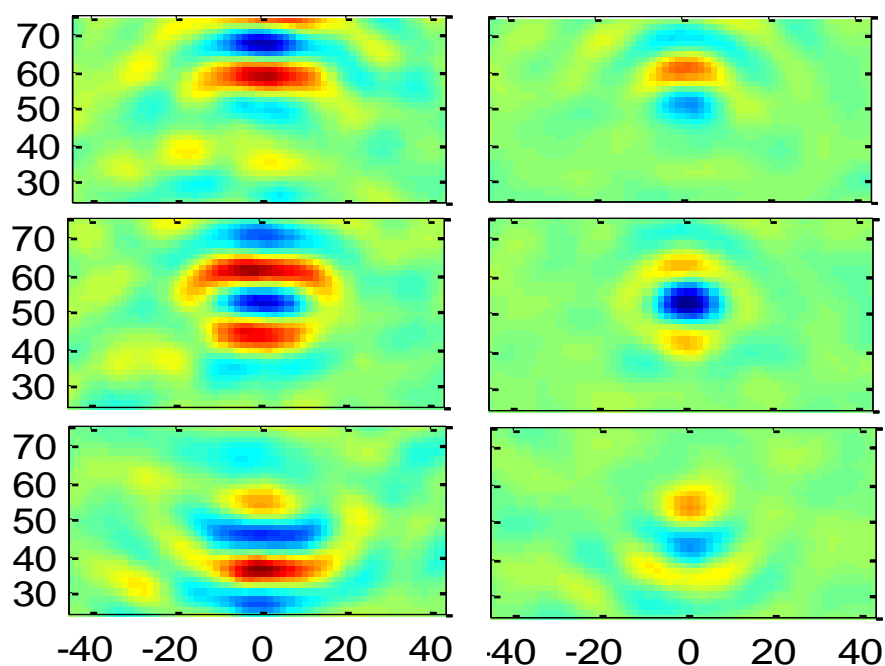


Fig. 2 : Wavefronts sampled at three time instants over a vertical plane, as they approach and leave the focal region (top to bottom): an example of local planar excitation (left column) and one limited by diffraction.

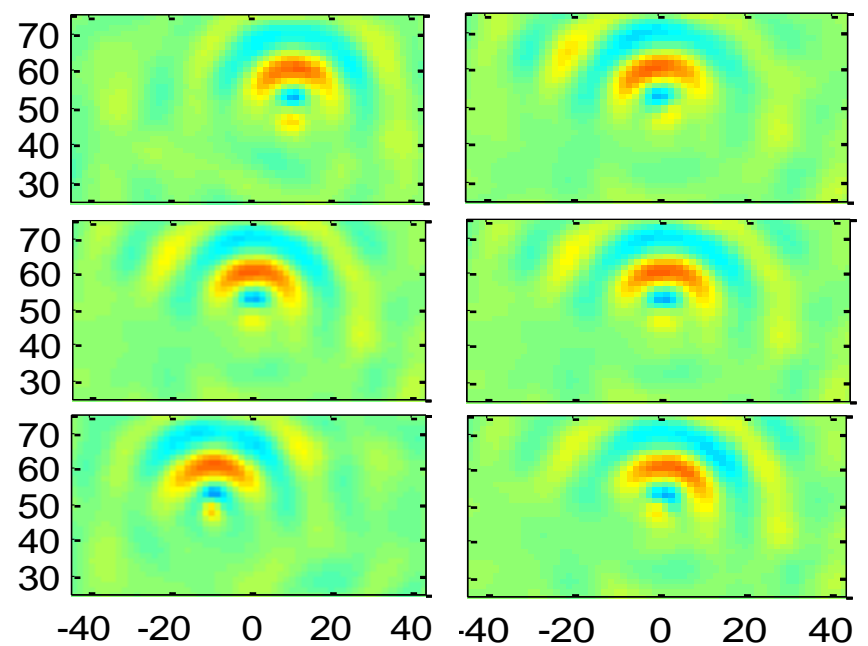


Fig. 3 : Testing the wavefront repeatability after translation (left column) and rotation (right column).

Observations: a) stable wavefronts against translation and rotation, b) good level of contrast (> 20 dB), c) good polarization control.

Applications : a promising application currently developed is imaging coupling paths in metallic shields. An example is shown below.

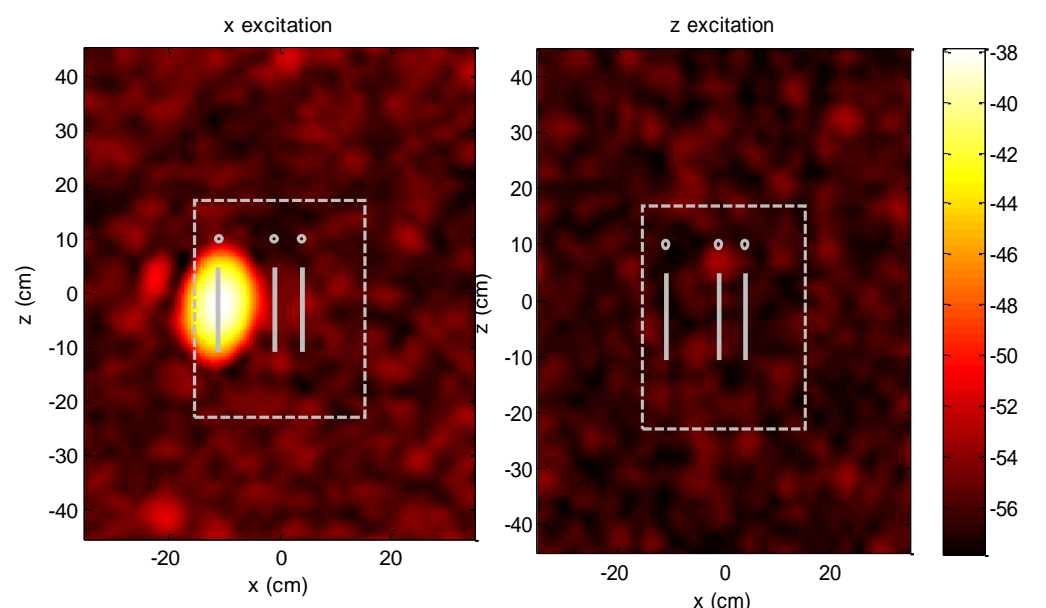


Fig. 4 : A transmission image of a slotted metal box, showing the position of a slot and its sensitivity to polarization. Moving focal spots were used in order to generate it.

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