

Ultrasound Signal Processing

Instructions for Beam Profile Simulations

Beam Profile from Single Element and Array Transducers

The enclosed folder contains the following Matlab-files to simulate the sound-field of single-element and array transducers using the Field II Matlab toolbox.

<code>transducer_field.m</code>	The main program for a single element transducer. All transducer parameters are defined here, and other files are called from this. This is the only file you need to modify when simulating a single-element transducer.
<code>array_field.m</code>	The main program for a transducer array. All transducer parameters are defined here, and other files are called from this. This is the only file you need to modify when simulating an array transducer.
Internal functions	
<code>define_transducer.m</code>	Defines the transducer for use by Field II, from the definitions in <code>transducer_field.m</code> .
<code>define_array_transducer.m</code>	Defines the transducer array for use by Field II, from the definitions in <code>array_field.m</code> .
<code>calculate_transducer_field.m</code>	Calculates the impulse response at each point for the single-element transducer, and uses this to calculate the pulse energy.
<code>calculate_one_way_array.m</code>	Calculates the impulse response at each point for the array transducer, and uses this to calculate the pulse energy.
<code>plot_one_way_power.m</code>	Visualizes the results in an intensity-plot.

Start Matlab, and initiate *Field II* as described below.

- 1) Ensure that the Field II library is available to Matlab by adding its folder to the Matlab path. On newer versions of Matlab, this is most easily done by right-clicking the folder, and selecting Add to path - Selected Folders and Subfolders.
- 2) Start Field by typing `field_init.m`

When this is done, open `transducer_field.m` and look at its contents. Run the file as it is, and see that you get results. Look at the transducer definition, and see that you understand what the parameters in the TR-structure mean.

Continue by modifying parameters in `transducer_field.m` as described in the exercise. Run the file and study the results.