Advanced Ultrasound Imaging Summer School 2015

Dual stage beamforming using In-Vivo data acquired from a BK3000 scanner

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1. Introduction

This exercise is the second of the two exercises of synthetic aperture sequential beamforming. The exercise concerns with performing the offline second stage beamforming on in-vivo data acquired with a BK3000 scanner.

In-vivo data acquired by each group will be available on the Campusnet under AUI 2015 > file sharing, soon after each scan session finished. You are also provided with a set of first stage data acquired by the BK3000 to start the exercise.

2. Preparation

To start with this exercise, you must have completed the implementation of the second stage beamformer in exercise 4.

3. Exercise

The transducer used in this exercise is the "10L2W" linear probe BK medical Aps. The specifications of the probe are listed as follows:

1x1 transducer

Property	Value
id	'10L2W'
nr_elements_x	192
nr_elements_y	1
f0	5500000
bw	3850000
pitch	2.4000e-04
kerf	3.5000e-05
height	0.0070
aclayerthickness	8.1200e-04
width	2.0500e-04
AROC	0
elevation_focus	0.0200
ROC	0
rcv_impulse_response_fs	40000000
xmt_impulse_response_fs	40000000
rcv_impulse_response	1
xmt_impulse_response	1
element_positions	*192x3 double*
element_directions	*192x3 double*
element_angles	*192x1 double*
elevation_curvature_height	3.0863e-04
type	'linear'

Add the folder "Support" to access all the required functions in this exercise.

a) Start by loading the 10L2W.xml and generating the transmit parameters (xmt) and the useCaseparams structures. Use the function “generate_useCaseParams.m” for this purpose:

```
[useCaseParams,xmt] = generate_useCaseParams(loadpath);
```

The 10L2W.xml includes all the transducer parameters and scan geometries needed for further manipulation of the acquired data.

b) Load your acquired first stage data. Data includes 30 frames in-vivo data acquired using the BK3000.

```
[data] = scannerdata2mat(datascanner,datamatlab);
```

> Note: A single frame first stage beamformed data from the phantom (CIRS Model 040GSE) is provided for you to start with the exercise (frame_n_0_p_1_0.hdf5).

c) Determine the pixel positions for the second stage beamformation.

```
[useCaseParams,rcv,tstart] = second_stage_setup(useCaseParams);
```

d) Perform the second stage beamformation on each acquired in-vivo frame. Use your implemented function in the exercise 4.

e) Generate a movie sequence of your second stage beamformed in-vivo data.

The second stage beamformed data of the phantom is shown, so you can compare your implementation.