ImageB 1.0 – Tutorial

J.P.E. Kimura – eiti@ceb.unicamp.br
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ImageB is open source software to visualize ultrasound bidimensional images from RF collected data. To load ImageB 1.0 execute file Imageb_1.0.exe from Binary folder.

Opening Data from Various RF Files

To illustrate this example will use a set of data collected in our laboratory. The target used in this experiment is a wire phantom (Fig. 1)

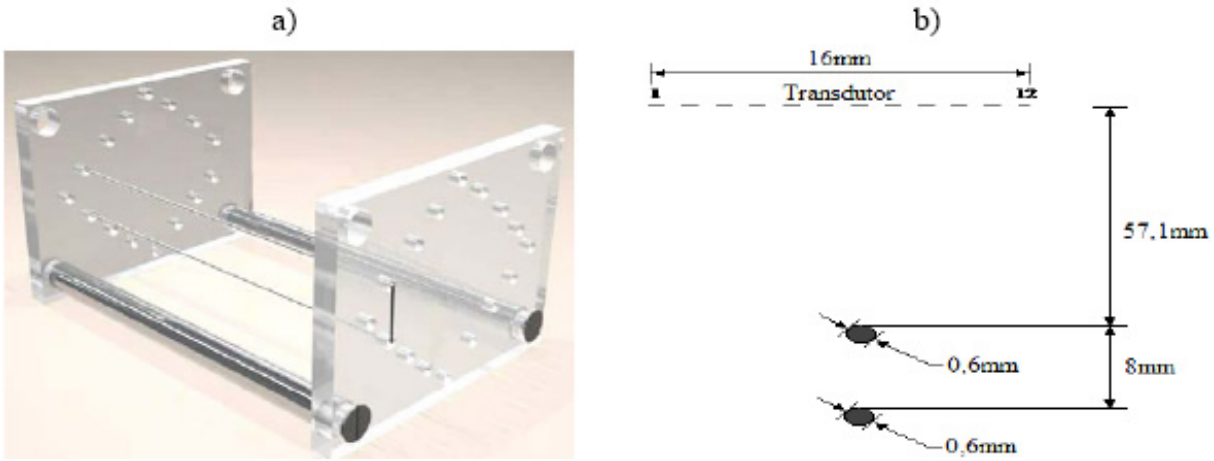
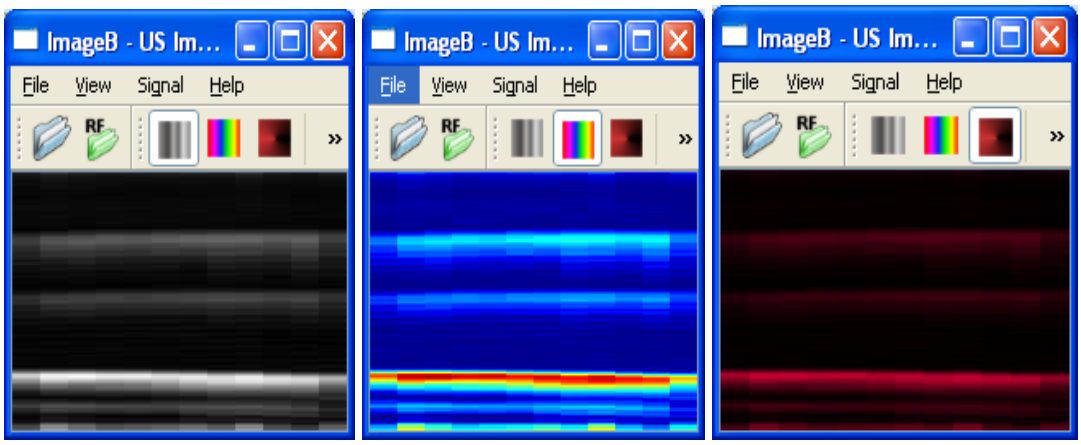


Fig. 1. Wire Phantom (a). Experiment setup and transducer positioning (b).

To generate a image from this data set, execute ImageB 1.0 :

- Click on the button: Open RF Files  , or menu File->Open RF Files
- Go to the directory ImageB 1.0 Package\RF Samples\wire phantom and select all *.CSV and open.
- ImageB has generated an image on screen where each file represents a slice of the image in grayscale. Now you can change the color map of image, try to click on the buttons:  . The result will be similar to Fig. 2

When you are working with this mode of visualization some functionalities are available to use, like signal setup, signal time cut, and process data using Synthetic Aperture Focusing Technique (SAFT).



(a) (b) (c)

Fig.2. Images using different color maps. Gray (a). Jet (b) and Red (c).

To get Image improved the RF data can modified using setup signal tool. With this tool you can specify the waveform of TGC (Time Gain Control), attenuation and threshold cut. Fig.3

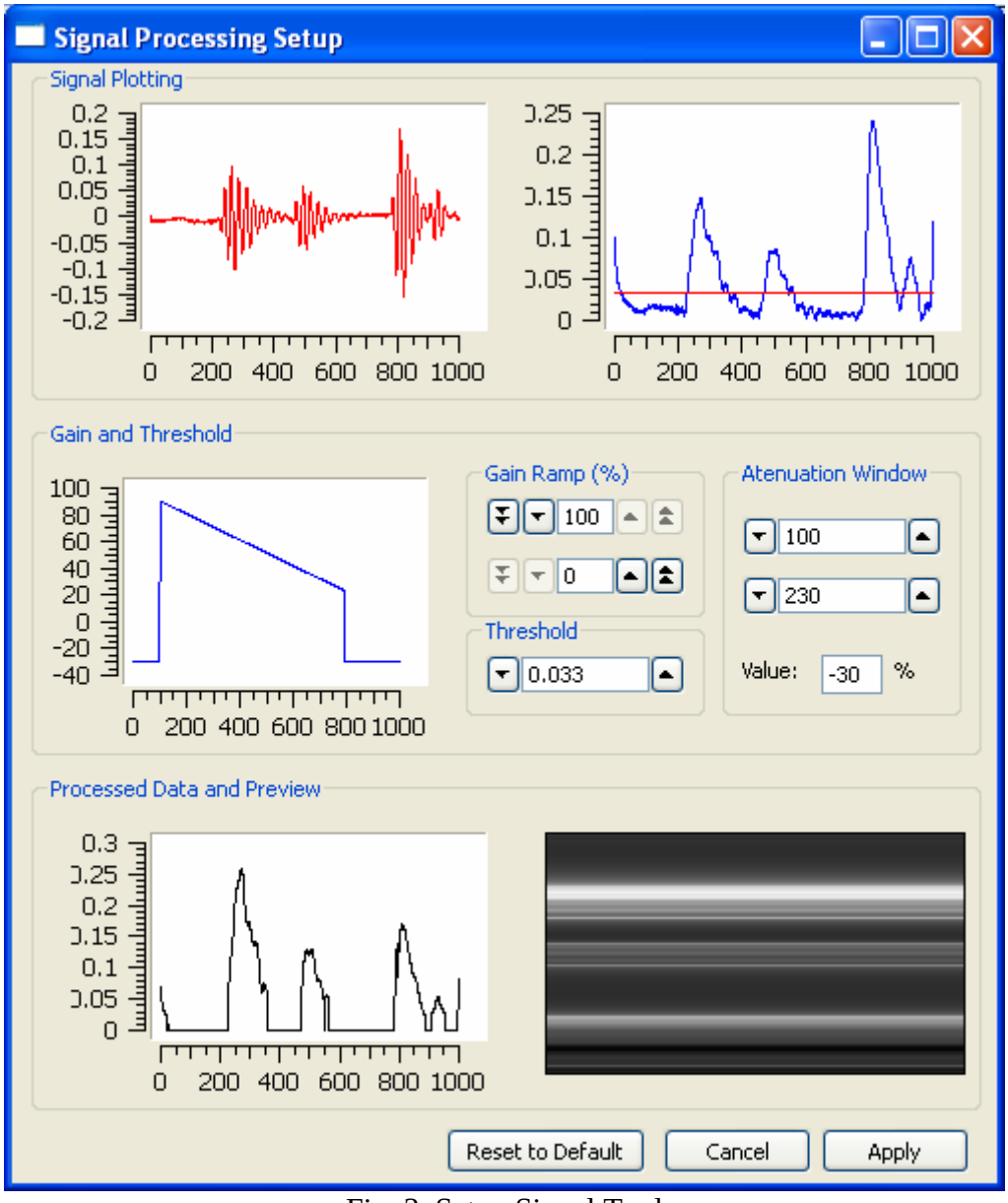


Fig. 3. Setup Signal Tool

To access setup signal tool click on the button  or select menu Signal->Setup Singnal.

The undesirable data from the extremities of the signal can be removed using the signal time cut tool (Fig. 4). To access signal setup tool select menu Signal->Time Signal Cut

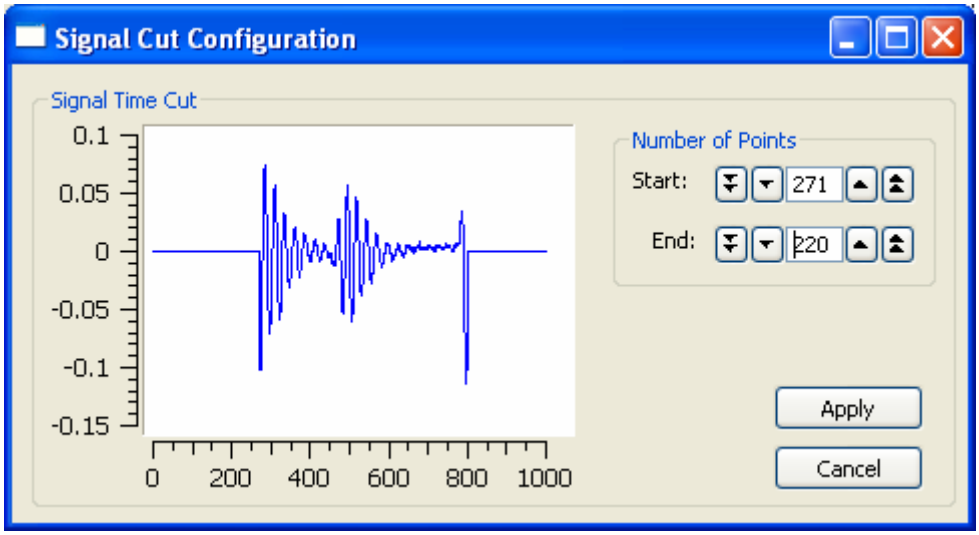
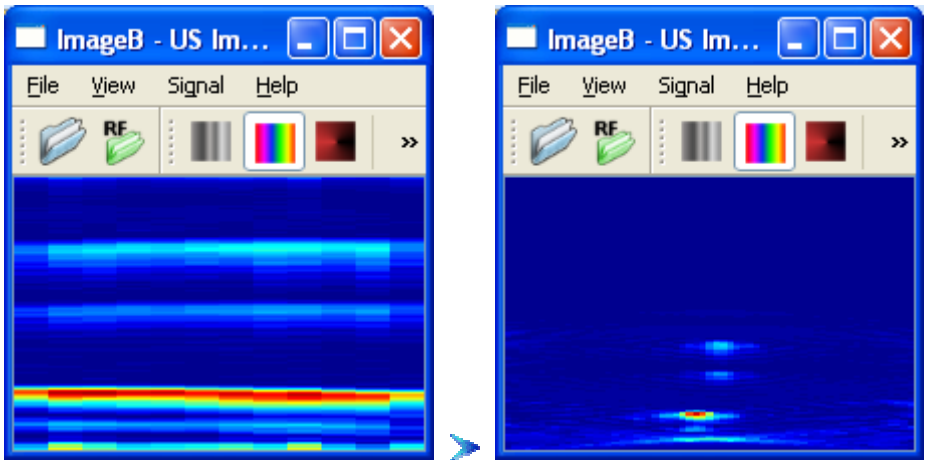


Fig. 4. configuration tool to remove undesirable data from the extremities of the signal

To process data using SAFT algorithm just click on button 

. The algorithm will be applied to a new image generation. Fig. 5



(a) (b)

Fig. 5. Data processed to grayscale using color map jet (a). Data processed using SAFT with jet color map.

Opening Data from unique RF File

The software is capable to load RF files in ASCII format delimited by a separator (; , <tab>). We have some examples of RF files distributed with this packed. The data can be found at ImageB 1.0 Package\RF Samples\misc.

To load RF data file click on the button  , or select menu File->Open Image DAT. Select the sample file ac1.dat and open it. The processed image will be displayed on the screen (Fig. 6)

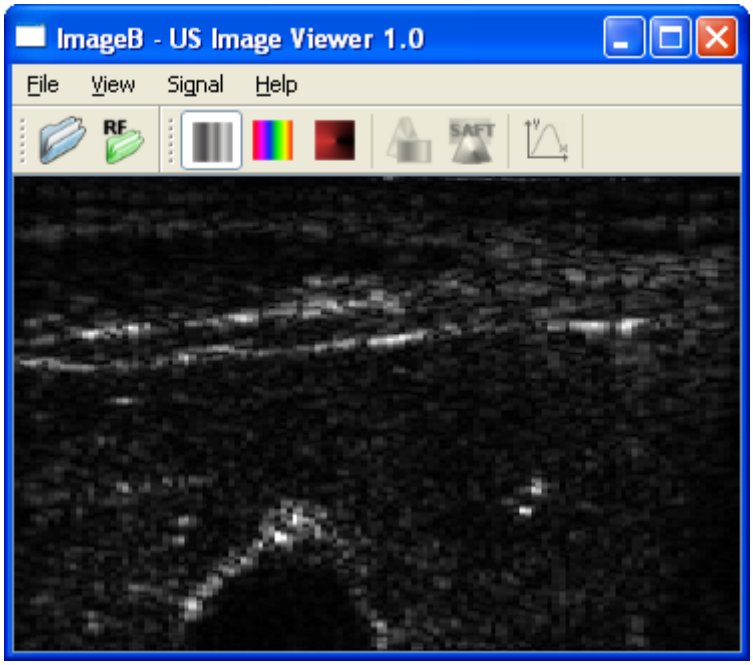


Fig.6. ImageB opening the ac1.dat RF sample file

Processing Data using SF

The ImageB is able to process RF data from Michigan University Database. The files are available in binary format (.dat) with a auxiliary file with information about acquisition (.prm). ImageB uses a pure Synthetic Focusing algorithm (SF) to process data. One of limitations of ImageB is that it is able to open files that were stored with 4096 or 2096 samples with 2 bytes per sample only.

To process data from Michigan University database, select menu Signal->Process SF Data. The processing screen will be shown (Fig. 7). :

- Click on the Open File Button
- Select a sample data file heart.dat in follow directory: \ImageB 1.0 Package\RF Samples\Michigan Data\heart and open it
- Load the file heart.prm in same directory to see the data properties. Use this file to feed the fields like Fig.7. The important fields to processing are: Number of Channels, A/D sampling rate, Time off set, samples per record, element space and sound velocity.

- Click on the Process button
- When the process will have finished, the image produced automatically will be shown.

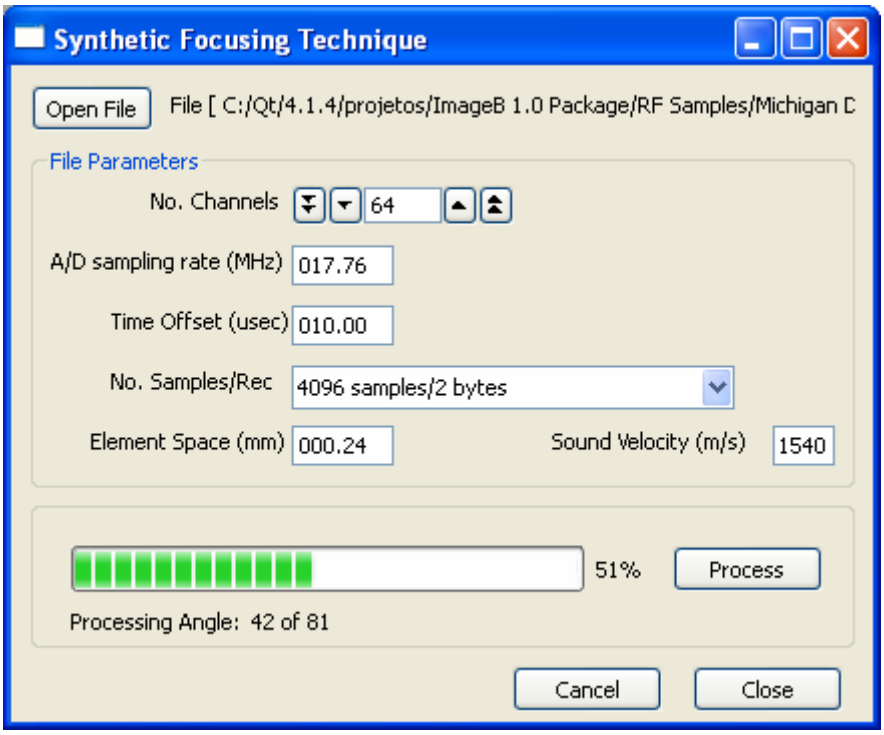
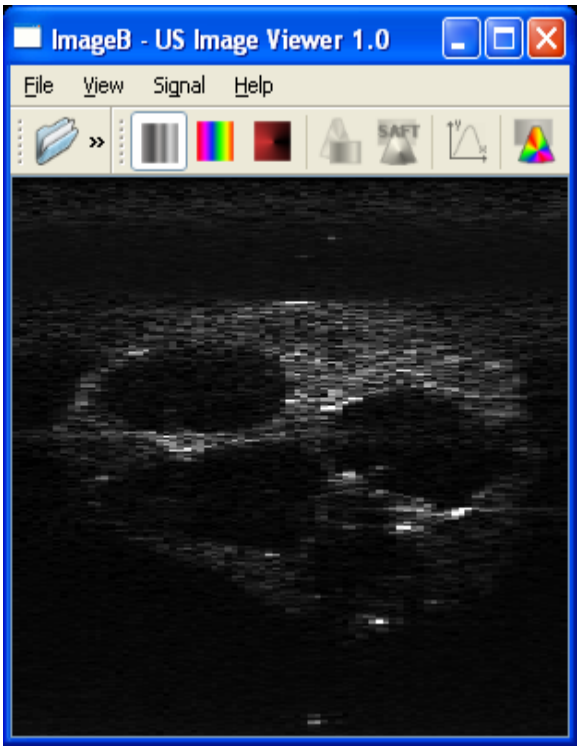
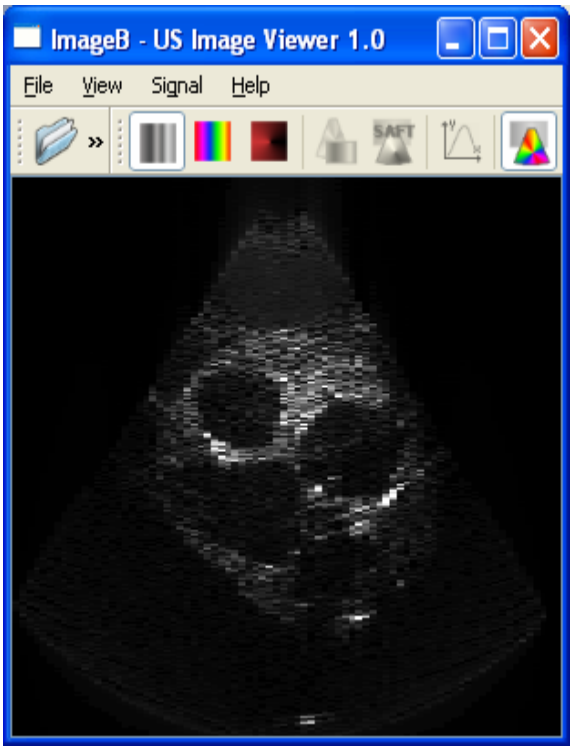


Fig. 7. Tool to process data using SF technique

The result is the processed image (Fig. 8). Notice that when the processed image was shown, a new button appears in toolbar. This button converts data from Cartesian to Polar plan  .



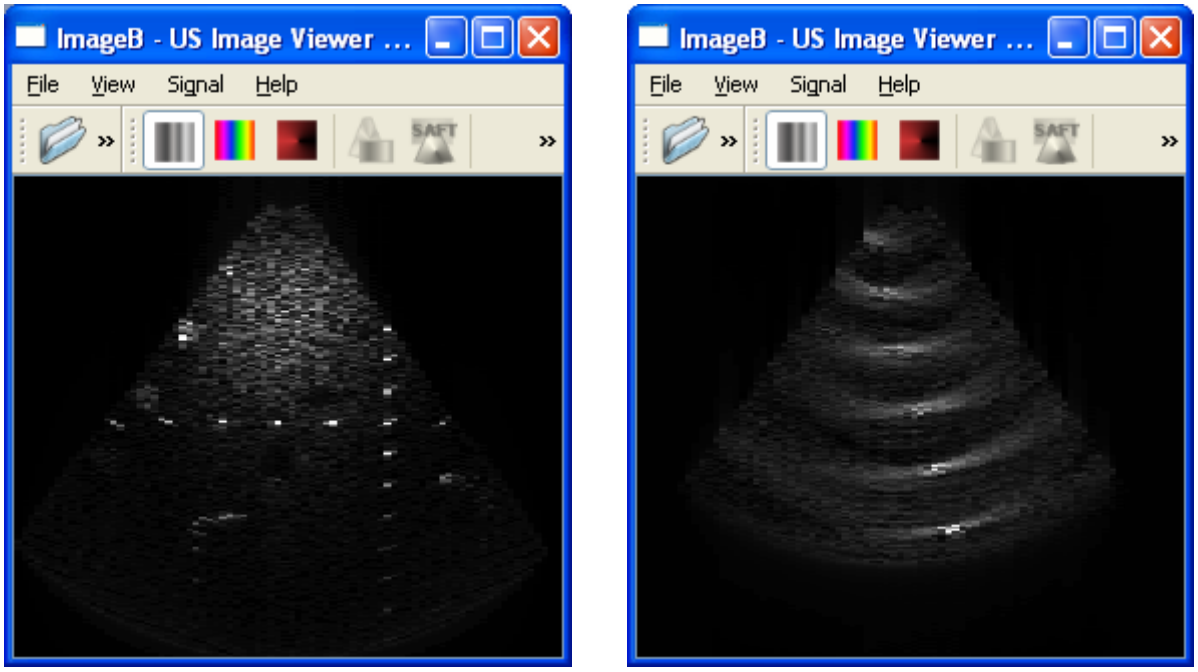
(a)



(b)

Fig. 8. Image processed in Cartesian coordinates (a). Image processed and converted to Polar coordinates (b)

If you would like to see other data samples from Michigan Database already processed, open data from folder ImageB 1.0 Package\RF Samples\Michigan Data\acuson17 and ImageB 1.0 Package\RF Samples\Michigan Data\geabr_0. In this case you will be able to use conversion from Cartesian to Polar coordinates and vice-versa (Fig. 9).



(a) (b)

Fig. 9. ImageB displaying images with polar coordinates. Image from geabr_0.dat processed (a). Image from acuson17 processed (b).