C.1 Quasi-Static Ultrasound Elastography

1. Apply a layer of ultrasound gel to the active transducer area
2. Begin a new "2D" imaging sequence on the machine using the "Breast" preset
3. Position the transducer for the desired lesion
   (a) Note the planar location of the lesion denoted on the sides of the phantom model
   (b) Place the active component on the surface of the phantom model
   (c) Align the transducer so as to intersect the lesion's planar location in a perpendicular manner
4. Adjust the depth of the image to reach the full domain depth of the phantom model (approximately 7.5 cm)
5. Save the current screen
6. Manually indent the transducer into the tissue by approximately 0.5 cm
7. Save the current screen
8. Repeat steps 3 – 7 until all desired images have been acquired
9. Export the images to "USB in PC format"
10. Import the images into MATLAB®
    (a) Crop the images so only the imaged domain is visible
11. Process the cropped images using a strain estimation algorithm

C.2 Acoustic Radiation Force Impulse Imaging

1. Apply a layer of ultrasound gel to the active transducer area
2. Begin a new "2D" imaging sequence on the machine using the "Breast" preset
3. Position the transducer for the desired lesion
   (a) Note the planar location of the lesion denoted on the sides of the phantom model

(b) Place the active component on the surface of the phantom model

(c) Align the transducer so as to intersect the lesion's planar location in a perpendicular manner

4. Adjust the depth of the image to reach the full domain depth of the phantom model (approximately 7.5 cm)

5. Using the ultrasound machine's trackball, select the "Virtual Touch imaging" button

6. Ensure the elastogram colour map is a gradient from black to white

7. Using the trackball and the "Next" button, adjust the position and size of the region of interest in order to fully capture the lesion and surrounding tissue

8. Press the "Update" button and hold the transducer as motionless as possible while the scan completes

9. Save the current screen

10. Wait for the cooling process to complete then press the "Freeze" button to unfreeze the image

11. Repeat steps 3 – 10 until all desired images have been acquired

12. Export the images to "USB in PC format"

13. Import the images into MATLAB®

14. Calculate the stiffness ratios by comparing the mean brightness of the elastograms inside the lesion to the mean brightness of the elastograms in an identical area located superior to the lesion

C.3 Shear Wave Speed Quantification

1. Apply a layer of ultrasound gel to the active transducer area

2. Begin a new "2D" imaging sequence on the machine using the "Breast" preset

3. Position the transducer for the desired lesion

(a) Note the planar location of the lesion denoted on the sides of the phantom model

(b) Place the active component on the surface of the phantom model

(c) Align the transducer so as to intersect the lesion's planar location in a perpendicular manner

4. Adjust the depth of the image to reach the full domain depth of the phantom model (approximately 7.5 cm)
5. Using the ultrasound machine's trackball, select the "Virtual Touch Quantification imaging" button
6. Using the trackball, position the region of interest within the lesionous region
7. Press the "Update" button and hold the transducer as motionless as possible while the scan completes
8. Record the shear wave speed (Vs) of the interrogated region
9. Wait for the cooling process to complete then press the "Freeze" button to unfreeze the image
10. Using the trackball, position the region of interest outside the lesionous region
11. Press the "Update" button and hold the transducer as motionless as possible while the scan completes
12. Record the shear wave speed (Vs) of the interrogated region
13. Wait for the cooling process to complete then press the "Freeze" button to unfreeze the image
14. Repeat steps 3 – 13 until all desired lesions have been investigated