

Exercise 5: COLE

- 1) Implement COLE for 2D linear array images assuming a constant lateral PSF with depth. Make an image of a regular grid of scatterers at different depths (similar to slide 15 of the COLE presentation).

Some numbers:

- 20 equal scatterers regularly distributed (start depth 30mm; stop depth 90mm)
 - FOV: axial: 20mm to 100mm; lateral: -7mm to +7mm
 - Number of lines in the image: 30
 - FWHM lateral PSF: 2mm
 - Gaussian pulse with centre frequency 2.5MHz
 - $f_s = 50\text{MHz}$
- 2) Use the transducer settings from exercise 2 to generate a LUT for your COLE implementation using FieldII. Use this LUT instead of the analytical expression for the lateral PSF to generate the same image.
 - 3) Construct a small rectangular tissue model (1cm x 1cm) positioned with its top-right corner at 1cm depth, 1cm lateral direction by randomly positioning 200 scatterers inside this region.
 - Produce multiple models in order to move the tissue model at a velocity of 10cm/s under an angle of 45 degrees (to the bottom, right) to simulate a system with a frame rate of 50Hz.
 - Simulate a linear array image of 10x5cm for each of the models and generate a movie