ReadMe file with description of MATLAB scripts and functions

1. backus\_avg\_script.m – Code to compare elastic vs viscoelastic Backus averaging using data from GP262 class

Dependencies:

1. srbtools (MATLAB scripts as part of srbtoolbox)
2. bkusrunavgvisco.m – MATLAB function for viscoelastic running Backus average
3. bkusrunavgnew.m – MATLAB function for elastic running Backus average
4. qeffemt.m – MATLAB function to calculate effective inverse Q in low frequency limit using viscoelastic velocity dispersion equation for nearly constant Q model
5. veffemt.m – MATLAB function to calculate effective velocity in low frequency limit using viscoelastic velocity dispersion equation for nearly constant Q model
6. Data – well2.mat; well2CorrectedDensity.mat; Well2CorrectedDensityDepth.mat; well\_2\_sats.txt; denpor\_brine.mat
7. Lookup.mat – defines the water saturation vs 1/Q relationship used
8. backus\_avg\_script\_blockQ.m – Same as backus\_avg\_script.m using a constant value of Q for the reservoir zone (Figure 2 of viscoelastic 1D scale effects paper)
9. non\_periodic\_distribution\_transfer\_function.m – Script to generate the power spectra of reflection and transmission transfer functions for non-periodic viscoelastic media (for example: Figure 22 of viscoelastic 1D scale effects paper)

Dependencies:

1. Kennett\_Q2\_tf.m – MATLAB function to output transfer functions
2. non\_periodic\_distribution.m – Script to calculate the velocity dispersion (for example: Figure 14 of viscoelastic 1D scale effects paper) and attenuation (for example: Figure 18 of viscoelastic 1D scale effects paper) for non-periodic media

Dependencies:

1. kenfdispslowQ.m – Kennett-Frazer method to calculate velocity dispersion and attenuation of layered viscoelastic media
2. velrt\_visco.m – Velocity at Ray theory limit
3. Kennett\_frazer\_waveform\_experiment.m – Script to calculate effective Q for periodic viscoelastic plastic-steel layer case (Figure 5 of viscoelastic 1D scale effects paper)

Dependencies:

1. Kenfdispslow.m – Kennett-Frazer method to calculate velocity dispersion and attenuation of layered elastic media
2. Lorentzfit.m – Function to fit data with Lorentzian function
3. kennett\_frazer\_waveform\_experiment\_sedimentary\_rocks.m – Script to calculate the velocity dispersion and attenuation curves for viscoelastic sedimentary layers case (Figure 8 and 9 of viscoelastic 1D scale effects paper)
4. phase\_shift\_elastic\_viscoelastic.m – Script for performing elastic and viscoelastic forward modeling for a three-layered earth model (Figure 7 of viscoelastic 1D scale effects paper)
5. transfer\_functions\_periodic.m – Script to generate the transmission and reflection transfer functions for periodic elastic and viscoelastic media (Figure 6 of viscoelastic 1D scale effects paper)
6. velratio\_kf.m – Script to generate the difference between harmonic average and viscoelastic upscaling (Figure 1 of viscoelastic 1D scale effects paper)

Dependencies:

1. viscoemt.m - Effective invq and velocity for low frequency limit based on just Q and layer properties for a particular frequency.
2. Waveforms\_only\_velocity.m – Script to generate velocity dispersion curve using waveforms and using Kennett-Frazer method for periodic medium (Figure 3 and 4 of viscoelastic 1D scale effects paper)

Dependencies:

1. crossing.m – Function to pick the first zero crossing from the waveforms
2. wigplot\_edit.m – Used for plotting seismograms