RPHIIItools. Matlab functions in the supplementary web site for the Rock Physics Handbook, 3rd Edition, by Mavko, Mukerji, and Dvorkin, 2020

AVO

- Shuey's AVO approximation for AVO.
 P-to-P AVO; single interface; Zoeppritz & approximations.
- P-to-S AVO; single interface; Zoeppritz & approximations.
- Calculates the reflectivity in the symmetry plane for interfaces between
orthorhombic media
 Reflectivity AVOZ in weakly anisotropic media
- Calculates P-P reflectivity at interface between two materials with weak arbitrary
anisotropy

CROSS RELATIONS and SOLID SUBSTITUTION

Cond_crossbound_manager- wrapper to call programs for cross bounds of electrical conductivity and bulk modulus

	Embbound_bulk	- Solid substitution for bulk modulus.
	Embbound_bulk_Dub	- Solid substitution for bulk modulus, where both phases can change.
	Embbound_shear	- Solid substitution for shear modulus.
	Embbound_shear_Dub	- Solid substitution for shear modulus, where both phases can change.
	gibiansky_torquato_crossbo	ounds - Gibiansky-Torquato electrical-elasticity cross bounds
	KS_GT_mtrends	- Computes Gibiansky-Torquato conductivity-elasticity cross bounds.
	KS_inclusion_plotsB	- Superimposes DEM and SCA inclusion models onto the Gibiansky-Torquato electrical-elasticity cross bounds
	Solidsquirt	- Solid substitution equivalent of the squirt model
	Solidsquirt_uf	- Solid substitution equivalent of the squirt model, unrelaxed frame
	Solidsub	- Solid substitution lower bound – generalized Gassmann
	Pwavesub	- Solid substitution of P-wave modulus, without knowledge of shear modulus.
	runGandT	- Computes Gibiansky-Torquato elastic-electrical cross bounds.
	runGandT4	- Computes Gibiansky-Torquato elastic-electrical cross bounds bounds.
EFI	FECTIVE MEDIUM, ELASTI	C
	berrysc	- Effective elastic moduli using Berryman's Self-Consistent approximation
	berryscm	- Effective elastic moduli for multi-component (n>2) composite using Berryman's Self-Consistent
	berryscp	- Effective elastic moduli vs. pressure for multi-component media using Berryman's Self-Consistent
	bkus	 Backus average for thin layered TI anisotropy
	bkusc	- Backus average for thin layered TI anisotropy
	bkuslog	- Backus average of segment of well log
	bound	- Voigt-Reuss & Hashin-Shtrikman elastic bounds
	bounds	- Voigt-Reuss & Hashin-Shtrikman elastic bounds
	c2anis	- Compute Thomsen parameters from VTI Voigt notation matrix
	c2sti	 Converts VTI elastic stiffnesses to elastic compliances
	c2vti	 Computes Vp, Vsh, and Vsv at any direction in a VTI material
	CSiso	- Creates Voigt notation compliance and stiffness matrices for isotropic material
	cti2v	 Computes Vp and Vs in the fast and slow directions of VTI material
	Cem	 Computes modulus-porosity trends from Dvorkin's contact cement model
	dem	 Effective elastic moduli using Differential Effective Medium approximation
	critpor	 Velocities, density, and moduli at critical porosity
	dem1	 Effective elastic moduli using Differential Effective Medium model
	dem_anisoC	- Anisotropic Differential Effective Medium, with aligned spheroidal inclusions
	dem_gm	 DEM - Effective elastic moduli using Differential Effective Medium
	demyprime	 f\Function called by the DEM programs
	echeng	 Eshelby-Cheng VTI model for aligned spheroidal inclusions

hash hashv hertzmind hertzmindv hudson	 Hashin-Shtrikman upper and lower bound effective moduli Hashin-Shtrikman upper and lower bound velocities Computes bulk and shear moduli of a dry elastic sphere pack using Hertz-Mindlin Computes P- and S-wave velocities of dry elastic sphere pack using Hertz-Mindlin Computes effective elastic moduli of rock with single set of aligned cracks, Hudson model
hudson1	- Computes effective elastic moduli of rock with single set of aligned cracks, Hudson model
hudson3	 Computes effective elastic moduli of rock with three perpendicular sets of cracks, Hudson model
hudsoncone	- Computes effective elastic moduli with crack normals randomly distributed at fixed angle of symmetry.
hudsonF	 Computes effective elastic moduli with crack normals oriented with Fisher distribution
HSaverageB	- Hashin-Shtrikman elastic bounds
John_Makse	 Effective elastic moduli with uniaxial strain of a random sphere pack. Makse correction to Norris-Johnson
Johnson	 Effective elastic moduli with uniaxial strain of a random sphere pack. Norris- Johnson model
ku2v	 Isotropic elastic velocities from input elastic constants
lm2v	- Isotropic elastic velocities from input elastic constants
moritanaka	- Mori-Tanaka method for effective elastic moduli for multi-component composite
sca_aniso	 Self-consistent approximation for moduli with a single set of aligned ellipsoidal inclusions
Unconsol	 Soft sand model – modified lower Hashin-Shtrikman curve with Hertz-Mindlin end points
v2cti	 VTI Elastic stiffness from velocities at angles 0, 45, and 90 degrees from the symmetry axis
v2ku	- Isotropic moduli computed from Vp, Vs, and density
v2lm	- Isotropic moduli computed from Vp, Vs, and density
walton	- Buik and shear moduli of a sphere pack using Walton's model
waltonv	 Velocities in a sphere pack using Walton's model

EFFECTIVE MEDIUM, ELECTRICAL

cond_aligned_inclusion_dem	 VTI electric conductivity resulting from single set of aligned cracks; DEM approximation
cond_aligned_inclusion_scm	 VTI electric conductivity resulting from single set of aligned cracks; SCA approximation
cond_Bruggeman_polarized	- Bruggeman conductivity model, random inclusions
cond_iso_inclusion_CM	- Effective dielectric constant using Clausius Mosotti approximation
cond_iso_inclusion_dem	 Effective electrical conductivity using differential effective medium model of spheroidal inclusions
cond_iso_inclusion_scmB	 Effective electrical conductivity using the self-consistent approximation of spheroidal inclusions
cond_iso_shells_scm	- Effective electrical conductivity for concentric spherical shells
demyprime_cond_Bruggeman_	polarized – program called by cond_Bruggeman_polarized
demyprimeN_cond_aligned	- program called by DEM model for aligned ellipsoidal inclusions
demyprimeN_cond_iso	 program called by DEM model for randomly oriented inclusions
Rfactor_cond_iso	- Computes the electric field concentration tensor, R, for a spheroidal inclusion
HSaverageCondB	 Hashin-Shtrikman bound on effective electrical conductivity

FLUID PROPERTIES AND FLUID SUBSTITUTION

BKc2c	- Brown-Korringa fluid substitution in terms of Voigt notation stiffnesses
BKd2s	- Brown-Korringa dry to saturated fluid substitution in terms of Voigt notation
	compliances

BKs2d	 Brown-Korringa saturated to dry fluid substitution in terms of Voigt notation compliances
BKs2s	- Brown-Korringa fluid substitution in terms of Voigt notation compliances
bkti	- Brown-Korringa fluid substitution
co2prop	- CO2 properties vs. Temperature and Pressure
gassmnk	- Gassmann fluid substitution of elastic bulk modulus
gassmnv	- Gassmann fluid substitution expressed as velocities
flprop	- Batzle-Wang relations for reservoir fluid properties
flpropui	- GUI to calculate Batzle-Wang relations for reservoir fluid properties
FluidSubMultiMineral	- Gassmann fluid substitution with average of multiple minerals
mmti	- Wet unrelaxed frame of VTI rock using squirt model
PERMEABILITY	
BernabeE	 Predicts permeability and porosity in rock with pressure-dependent pores and cracks
Bloch	- Predicts permeability and porosity in sandstone.
CoatDum	 Coates-Dumanoir equation for permeability from porosity and irreducible water saturation
Coates	- Equation for predicting permeability from porosity and irreducible water saturation
FredrichE	- Predicts permeability from porosity and formation factor
KozCarmE	- Original Kozeny-Carman relation for permeability
ModKozCarm	- Generalization of Kozeny-Carman in terms of pore diameter, geometric factor,
	porosity, and percolation porosity
Owolabi	- Predicts permeability in unconsolidated sands of Eastern Niger delta
PandaLake	- Predicts permeability in terms of tortuosity and particle size distribution extending Kozeny-Carman
PandaLakeKCE	- Predicts the effect of cement on permeability
PermMenu	- Wrapper to call other permeability predictors
Limur	- Predicts permeability from porosity and irreducible water saturation
WylGregE	- Empirical prediction of permeability in unconsolidated sands of Eastern Niger delta - Predicts permeability from porosity and specific surface area
SYNTHETIC SEISMIC TRACE	S
eimp	 Predicts elastic far-offset elastic impedances for P-to-P and P-to-S
eimp2	 Predicts elastic far-offset elastic impedances for P-to-P and P-to-S
ezseis	 Quick approximate synthetic seismic traces from low-pass filtering of reflectivity sequence
iatrib	- Estimates instantaneous seismic attributes from an image
kenfdisp	- Kennet-Frazer algorithm to predict velocity vs. Frequency in normal-incidence layered earth
kenfrtt	- Kennet-Frazer algorithm to predict normal incidence travel time in layered earth
kennet	- Synthetic seismograms for plane wave, normal incidence propagation
kennett_aux	- Synthetic seismograms for plane wave, normal incidence propagation
rtcappp	- Synthetic ray-trace P-to-P seismic section in a 1D layered earth model
rtadapa	- Synthetic ray-trace P-to-P seismic section with Q in a TD layered earth model
rtedpps	- Synthetic ray-trace P-to-S seismic section with Q in a 1D layered earth model
rtananiaa	- Synthetic ray-trace P-to-S seismic section with Q in a TD layered earth model
nppaniso	- Synthetic Tay-trace P-to-P seismic section in a TD layered earth model with VTT layers
Sourcewalt gary	- Generates Claerbout's minimum phase wavelet
pastor	- Ocherates Olderbours Infinition phase wavelet
pgaloi	- r ropagator mains memou for synthetic seismograms for plane wave, normal
	incluence propagation
bayesclass	- Baves classification based on pdf
blockav	- Block average of logs or signals

cbtitle	- puts a title on a colorbar, analogous to title.m
ezbond	- coordinate transformation of elastic matrix in Voigt notation
fftplot	- plot amplitude and phase spectrum of time series.
fillnan	- replaces NANs in a vector using a variety of interpolators
find dependencies	- Generates a dependency report for a single function
ft1axis	- Fourier Transform in time axis(column-wise).
ft2axis	- Fourier Transform in space axis(row-wise).
hist2d	- 2 Dimensional Histogram.
hist3d	- 3 Dimensional Histogram.
interpnext	- a form of interpolation that chooses the next existing value rather than an average of multiple values
loadlas	- Reads well-log las file and puts curves into a Matlab structure
monte	- Monte-Carlo draws from non-parametric marginal cdf followed by linear regression
monteccdf	- Monte-Carlo draws from non-parametric conditional cdfs
outputdlg	- folder of calls for quick change of markersize and fontsize in an existing plot
pdfbayes	- Non-parametric pdf estimation, Bayes' error & Information
radiodlg	- created a dialog box with radio buttons, somewhat analogous to inputdlg m
scatterqq	- alternative to scatter plot
shortcuts folder	- folder of calls for quick change of markersize and fontsize in an existing plot

VISCOELASTICITY AND DISPERSION

biot	 Velocity dispersion and attenuation from Biot theory
biothf	- High frequency limiting velocity from Biot theory
biothfb	- Approximate high frequency limiting velocity from Biot theory
patchw	 White's patchy model with Dutta-Ode correction
squirt	 Mavko squirt model for high frequency saturated velocities
stdlin	- Standard linear viscoelastic solid
viscoelastic	 Creates dispersion curves for common viscoelastic models