

List of MATLAB routines belonging to

“MIMO OFDM Wireless Communication with MATLAB” which has been authored by Yong S. Cho, Jae K. Kim, Won Y. Yang, and Chung G. Kang and published by Wiley in 2010.

MATLAB routine name	Description
add_CFO()	add CFO (carrier frequency offset) to a given signal
add_CP()	append the CP (cyclic prefix)
add_pilot()	generate/insert a pilot sequence
add_STO()	add STO (symbol time offset) to a given signal
Alamouti_scheme	simulate the Alamouti space-time block coding
Alamouti_2x1_ant_selection	Antenna selection for OSTBC (Orthogonal Space-Time Block Code)
Alamouti_2x1_precoding	Alamouti coding with precoded OSTBC
assign_offset()	allocate the offset angle for each subray
ber_QAM()	BER of M-ary QAM in AWGN/Rayleigh channel for given EbN0dBs
Block_diagonalization	Block diagonalization method using zero-forcing detection
bound()	find the lower/upper bounds for a given transition
calculate_norm()	calculate the norms of given vectors in ‘stage_processing1’
CCDF_of_clipped_ filtered_OFDM_signal	PAPR and BER analysis of a QPSK/OFDM system with the clipping and filtering technique
CCDF_OFDMA()	CCDF of OFDM signal without PAPR reduction technique
CCDF_PAPR_DFTspreading()	CCDF and PAPR of an OFDMA signal with DFT spreading
CCDF_PTS()	CCDF of OFDM signal with PTS technique
CFO_Classen	frequency-domain CFO estimation using pilot tones
CFO_CP()	time-domain CFO estimation based on CP (cyclic prefix)
CFO_estimation()	estimate the CFO using time/frequency-domain techniques
CFO_Moose	frequency-domain CFO estimation using preamble
channel1()	channel generation for STTC (Space-Time Trellis Code)
channel_coeff()	generate a correlated MIMO fading channel
channel_estimation	perform channel estimation using LS/MMSE/DFT methods
clipping()	clip a signal with a given CR (clipping ratio)
codebook_generator()	generate a codebook used in ‘Alamouti_2x1_precoding’
compare_DFT_spreading	plot the PAPRs of OFDMA/LFDMA/IFDMA signals
compare_DFT_spreading_w_psf	DFT spreading with/without pulse shaping filter and different number of subcarriers per terminal (user)
compare_PTS_CCDF	PAPR with PTS (Partial Transmit Sequence) technique
compare_vector_norm()	convert_UWB_ct() routine used in ‘plot_UWB_channel’
convert_UWB_ct()	convert a continuous-time channel into a discrete-time one
data_generator()	dB-to-watt conversion
dB2w()	DPC or THP for a multi-user MIMO system
Dirty_or_TH_precoding	Doppler spectrum function
Doppler_PSD_function	Doppler spectrum
Doppler_spectrum()	Look-up table for uniform power subray-based offset angles
equalpower_subray()	CDF of ergodic capacity of a MIMO channel
Ergodic_Capacity_CDF	Channel capacity reduction due to correlation
Ergodic_Capacity_Correlation	plot the ergodic channel capacity vs. SNR
Ergodic_Capacity_vs_SNR	generate an exponential PDP (power delay profile)
exp_PDP()	IFFT and oversampling (interpolation)
IFFT_oversampling()	

MATLAB routine name	Description
FWGN_ff()	a modified frequency-domain FWGN channel
FWGN_model()	filtered white Gaussian noise (FWGN) channel model
FWGN_tf()	a time-domain FWGN channel
guard_interval()	GI (guard interval) insertion
gen_filter()	generate Doppler filter coefficients
gen_phase()	generate the phase for each subray
IEEE_802_11_model()	IEEE 802.11 channel model
Interpolate	channel interpolation between pilots
list_length()	count the number of elements before the first zero in a given list
LRAD_MMSE()	Lattice Reduction-Aided Detector with MMSE detection
LS_CE()	LS (least-square) channel estimation
mapper()	BPSK/QAM modulation
MIMO_channel_cap_	MIMO channel capacity with optimal antenna selection
ant_sel_optimal	
MIMO_channel_cap_	MIMO channel capacity with suboptimal antenna selection
ant_sel_subopt	
ML_detector()	Maximum Likelihood detector
MMSE_CE()	MS (minimum mean-square-error) channel estimation
MMSE_detection_2x2	MMSE detection for 2×2 MIMO system
modulation()	modulation and oversampling
modulator()	BPSK, QPSK, 8-PSK, 16-QAM mapping function
modulo()	complex modulo operation used in 'Dirty_or_TH_precoding'
MRC_scheme	plot the performance of MRC for Rayleigh fading channels
multi_user_MIMO	simulate a multi-user MIMO system with channel inversion
OFDM_basic	simulate a basic OFDM transmission system
OFDM_signal	plot time-domain OFDM signals and their pdfs
OL_CL_Comparison	Ergodic channel capacity: open-loop vs. closed-loop
original_LLL()	LLL (Lenstra-Lenstra-Lovasz) algorithm
OSIC_detector()	the various OSIC signal detection methods
PAPR()	compute the PAPR (Peak-to-Average Power Ratio) of a signal
PAPR_of_Chui	plot the PAPR of Chui sequence in the time-domain
PDF_of_clipped_and_	plot the PDF (probability density function) of a clipped
filtered_OFDM_signal	and filtered OFDM signal
PL_free()	free space path loss model
PL_HATA()	Hata path loss model
PL_IEEE80216d()	IEEE 802.16d path loss model
PL_logdist_or_norm()	distance/normal shadowing path loss models
plot_ber()	read and plot EbN0dBs/BER from file and theoretical ones
plot_CCDF	plot CCDF (complementary cumulative distribution function)
plot_IEEE80211_model	plot an IEEE 802.11 channel model
plot_FWGN	plot an FWGN channel model
plot_modified_FWGN	plot modified FWGN channel models
plot_PL_general	plot the various path loss models
plot_PL_Hata	plot the Hata path loss model
plot_PL_IEEE80216d	plot IEEE802.16d path loss model
plot_ray_fading	plot a ray-based channel model
plot_Ray_Ric_channel	plot Rayleigh/Rician fading channels
plot_SUI_channel	plot an SUI channel model

MATLAB routine name	Description
plot_SV_model_ct	plot a (continuous-time) Saleh-Valenzuela channel model
plot_2ray_exp_model	plot a 2-ray channel model and an exponential model
plot_UWB_channel	plot a UWB channel model
pre_MMSE	Pre-MMSE equalization
Q()	co-error function $Q(x) = (1/\sqrt{2\pi}) \int_x^\infty e^{-t^2/2} dt$
QAM16_slicer()	slice a series of 16QAM symbols
QAM16_slicer_soft()	slice a series of 16QAM symbols into soft values
QPSK_demapper()	QPSK demapping
QPSK_mapper()	QPSK mapping
QPSK_slicer()	slice a series of QPSK symbols
QRM_MLD_detector()	QRM MLD detector routine used in QRM_MLD_simulation
QRM_MLD_soft()	QRM MLD soft routine used in QRM_MLD_simulation
QRM_MLD_simulation	simulate the QRM MLD scheme
radius_control()	control radius
Ray_model()	Rayleigh fading channel model
remove_CP()	remove the CP (cyclic prefix)
remove_GI()	GI (guard interval) removal
Ric_model()	Rician fading channel model
SD_detector()	Sphere Decoding detector
single_carrier_PAPR	plot the PAPRs of basband/passband single-carrier signals
soft_decision_sigma()	soft Viterbi decoding for SISO system
soft_hard_SISO	hard/soft-decision detection for SISO system
soft_output2x2()	soft output of MMSE detector for 2×2 MIMO system
sort_matrix()	Matrix sorting routine used in stage_processing1()
SQNR_with_	plot the SQNR of a quantized and clipped OFDM signal
quantization_clipping	against clipping level
SQRD()	Sorted QR Decomposition
stage_processing()	Stage processing routine used in 'SD_detector'
stage_processing1()	Stage processing routine used in 'QRM_MLD_detector'
STBC_3x4_simulation	simulate 3x4 STBC (Space-Time Block Code)
STO_by_correlation	CP-based symbol synchronization using the correlation
STO_by_correlation	CP-based symbol synchronization using the difference
STO_estimation()	CP-based symbol timing offset (STO) estimation
STTC_detector()	STTC (Space-Time Trellis Code) detector
STTC_simulation	simulate the STTC (Space-Time Trellis Code) scheme
STTC_stage_modulator	STTC stage modulator routine used in 'STTC_simulation'
STTC_modulator()	STTC modulator routine used in 'STTC_simulation'
SUI_fading()	FWGN (filtered white Gaussian noise) for SUI channel model
SUI_parameters()	set the SUI channel model parameters
SV_model_ct()	A continuous-time realization of Saleh-Valenzuela channel
test_orthogonality	test the orthogonality among OFDM signals
trellis_encoder()	trellis encoding routine used in STTC_simulation
UWB_model_ct()	UWB channel model
UWB_parameters()	set the UWB channel model parameters
vector_comparison()	1/0 depending on whether or not two vectors are the same
Water_Pouring()	water pouring algorithm
zero_pasting()	paste zeros at the center half of the input sequence
zero_insertion()	insert zeros between the samples of input sequence