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For any researchers who use the code, or its modified version, in your scientific work, please use the following citation:

S. Wu, C.-X. Wang, M. Aggoune, M. M. Alwakeel, and X. You, "A general 3D non-stationary 5G wireless channel model," *IEEE Trans. Commun.*, vol. 66, no. 7, pp. 3065–3078, July 2018.

Also, we will appreciate it very much if you can acknowledge the efforts of producing and sharing these Matlab programs, e.g., "The authors would like to acknowledge the support of Dr. Shangbin Wu from Samsung Research and Development Institute, U.K., Dr. Yu Fu and Prof. Cheng-Xiang Wang from Heriot-Watt University, Edinburgh, U.K., and Mr. Ji Bian from Shandong University, China, for sharing the MATLAB implementation of the general 5G channel simulator.".

If you have any comments, questions, or feedback, please do not hesitate to contact the aforementioned authors using the following email addresses:{y.fu, Cheng-Xiang.Wang}@hw.ac.uk and bianjimail@163.com.

Matlab Codes of TVT'18 paper titled "A general 3D non-stationary 5G wireless channel model"

Folder: Channel_Model

The following table shows a list of Matlab files that can be used to generate the channel impulse response of the proposed model in [1].

[1] S. Wu, C.-X. Wang, M. Aggoune, M. M. Alwakeel, and X. You, "A general 3D non-stationary 5G wireless channel model," *IEEE Trans. Commun.*, vol. 66, no. 7, pp. 3065–3078, July 2018.

Table I MATLAB CODES AND DESCRIPTIONS.

Matlab code	Description
SpaceTimeUnifiedFramework.m	The main function that generate the parameters and CIRs, which calls the rest functions.
ArrayTimeEvolution.m	Evolve parameters of the model on time and array axis.
MEA_Laplace_offset_cal.m	Generate angles that follow Laplace distribution.
OmniFieldPattern.m	Generate the field pattern of omni antennas.
DipoleFieldPattern.m	Generate the filed pattern of dipole antennas.
load_para_x.m	Contain the parameters of the model for certain scenarios.

The following table shows a list of channel model parameters and definitions contained in "load_para_x.m" files. The user can replace them with their own values that are extracted from channel measurements.

Table II CHANNEL MODEL PARAMETERS AND DEFINITIONS.

Channel model parameters	Definition	Channel model parameters	Definition
M_T	Number of Tx antennas	M_R	Number of Rx antennas
fc	Carrier frequency	Lambda	Wavelength
K_ricean	Ricean factor in dB	K_ricean_lin	Ricean factor in linear
rand_seed	Random seed	D	Distance between the transmitter and receiver
nu_A_T	Azimuth angle of Tx antenna array	nu_E_T	Elevation angle of Tx antenna array
nu_A_R	Azimuth angle of Rx antenna array	nu_E_R	Elevation angle of Rx antenna array
theta_v_R	Azimuth angle of the movement of the Rx array	xi_v_R	Elevation angle of the movement of the Rx array
theta_v_T	Azimuth angle of the movement of the Tx array	xi_v_T	Elevation angle of the movement of the Tx array
delta_tx	Antenna space/wavelength for Tx	delta_rx	Antenna space/wavelength for Rx
lambdaG	Generation rate	lambdaR	Recombination rate
DS_miu	Delay spread mean in dB	DS_sigma	Delay spread variance in dB

DS_r	Delay scaling parameter	AAoA_variance	Variance AAoA from COST2100 doc
AAoD_variance	Variance AAoD from COST2100 doc	EAoA_variance	Variance EAoA from COST2100 doc
EAoD_varianc	Variance AAoD from COST2100 doc	mean_num_subpath	Mean number of subpaths within a cluster
mean_delay_subpat h	Mean delay of subpaths within a cluster	A_Corr_distance	Antenna correlation distance
T_Corr_distance	Time correlation distance in second	T0	Intial time
Tend	End time	dT	Sampling Interval
T_length	Length of time axis	P_F	Percentage of fluctuating MPCs
v_F	Mean cluster velocity	v_R	Speed of velocity of receiver
v_c	Cluster velocity	v_T	Speed of velocity of transmitter
Per_cluster_shadow ing	Per cluster shadowing std in dB	Polar_kappa	Polarization coefficient in dB
Polar_kappa_linear	Polarization coefficient linear	FieldPatternTx	Dipole antenna field pattern for Tx
FieldPatternRx	Dipole antenna field pattern for Rx	Tx_Rot_x	Rotation of Tx with respect to x
Tx_Rot_y	Rotation of Tx with respect to y	Tx_Rot_z	Rotation of Tx with respect to z
Rx_Rot_x	Rotation of Rx with respect to x	Rx_Rot_y	Rotation of Rx with respect to y
Rx_Rot_z	Rotation of Rx with respect to z		

Matlab Codes of the 5G Channel simulator

The following table shows a list of Matlab files that can be used to generate the a 4-D channel matrix **H** between all transmitter and receiver antenna combinations of MIMO system. The format of channel matrix is MR×MT×T×N, where MR is the number of Rx antenna elements, Tx is the number of Tx antenna elements, T is the number of time samples, and N is the number of clusters. In addition, after each simulation, the channel matrix is stored in the data file “H_x.mat”, where “x” is “mmWave”, “MaMIMO”, “M2M”, and “HST” for mmWave, Massive MIMO, M2M, and HST communication scenarios, respectively.

Folder: CIR_Generator

TABLE III. MATLAB CODES AND DESCRIPTIONS

Matlab codes	Description
Channel_Generate_mmWave.m	Generate the channel matrix **H** for mmWave communication scenarios.
Channel_Generate_MaMIMO.m	Generate the channel matrix **H f**or MaMIMO communication scenarios.
Channel_Generate_HST.m	Generate the channel matrix **H** for HST communication scenarios
Channel_Generate_M2M.m	Generate the channel matrix **H** for M2M communication scenarios.