rangemx is a Matlab callable function of fortran program RGCALC which calculate the range of a pulse radar

Radar range

Ref.:

NRL Report 7448
A Fortran Computer Program to Calculate the Range of a Pulse Radar
L. V. Blake August 28, 1972

NRL Report 7461
Radar/Radio Troposheric Absorption and Noise Temperature
L. V. Blake October 30, 1972

Matlab version : 2022a update 7

Fortran compiler : Intel oneapi 2023.2.0 (ifort)

Operating system : Mac OS Monterey v. 12.6.8

rangemx	**rangemx**					
Input array	**Output array**	**Data type**	**Fortran/*mex* variable**	**Parameter description**	**Value**	**Note**
x(1,1)	y(1,1)	Real	PT	Peak Pulse Power (kW)		
x(1,2)	y(1,2)	Real	TAU	Pulse Duration (usec)		
x(1,3)	y(1,3)	Real	GT	Transmit Antenna Gain (dB)		
x(1,4)	y(1,4)	Real	GR	Receive Antenna Gain(dB)		
x(1,5)	y(1,5)	Real	FM	Frequency (MHz)		
x(1,6)	y(1,6)	Real	ANF	Receiver Noise Factor (dB)		
x(1,7)	y(1,7)	Real	CB	Bandwidth Correction Factor (dB)		
x(1,8)	y(1,8)	Real	ALA	Antenna Ohmic Loss (dB)		
x(1,9)	y(1,9)	Real	ALT	Transmit Transmission Line Loss (dB)		
x(1,10)	y(1,10)	Real	ALR	Receive Transmission Line Loss (dB)		
x(1,11)	y(1,11)	Real	ALP	Scanning-Antenna Pattern Loss (dB)		
x(1,12)	y(1,12)	Real	ALX	Miscellaneous Loss (dB)		
x(1,13)	y(1,13)	Integer	NP	Number of Pulses Integrated	>= 1	If KA = 6 or 7 (NP is ignored)
x(1,14)	y(1,14)	Real	PD	Probability of Detection or SNR (dB)	PD: 0.1 - 0.95	If KA = 6 or 7 (PD = SNR and there is no range limit)
x(1,15)	y(1,15)	Real	FA	False-Alarm Probability (Negative Power of Ten) or SNR (dB)	FA : 4.0 - 12.0	If KA = 6 (FA is ignored) If KA = 7 (FA = SNR and there is no range limit)
x(1,16)	y(1,16)	Real	SIG	Target Cross Section (Square Meters)		
x(1,17)	y(1,17)	Real	EL	Target Elevation Angle (Degrees)		

	x(1,18)	y(1,18)	Integer	NS	Solar and Galactic Noise	-1,0,1	-1 = Minimum 0 = Average 1 = Maximum
	x(1,19)	y(1,19)	Integer	KA	Swerling Fluctuation Case	0-7	0 - 4 = Calc. range for one Swerling Case 0, 1, 2, 3 or 4 5 = Calc. range for all Swerling Case 0 to 4 6 = Calc. range for one SNR (PD=SNR) 7 = Calc. range for two SNR (PD=SNR, FA= SNR)
	x(1,20)	y(1,20)	Real	RHOFAC	Water-vapor density multiplicator for Standard atmosphere	1-2	1 = Attenuation and noise temperature calculated for a surface water-vapor density of 7.5 g/m3 (default) 2 = Value for surface water-vapor density of 15 g/m3
		y(1,21)	Integer	*INERR*	Mex Error flag - Out of range error for input parameters PD, FA or NP (calculation aborted) - prevent issue with MARSWR calculation.	1-3	0 = no error 1 = PD error 2 = FA error 3 = PN error
		y(2,1)	Real	TA	Antenna noise temperature (K)		
		y(2,2)	Real	TR	Receiving Transmission Line noise temperature (K)		
		y(2,3)	Real	TE	Receiver noise temperature (K)		
		y(2,4)	Real	TEI	TE X Line-Loss Factor = TEI (K)		
		y(2,5)	Real	TSYS	System (TA + TR + TEI) (K)		
		y(2,6)	Real	ATTN(3,75)	Two-Way Attenuation Through Entire Troposphere (dB)		
		y(2,7)	Real	YB	Detector Threshold (dB)		
		y(2,8)	Integer	*IERR*	Error Flag from MARSWR.FOR input parameter range error (MARSWR calculation is aborted. The fortran program may stop responding and user need to manually kill Matlab)	0-1	0 = no error 1 = MARSWR Fortran internal routine return an out of range parameter error
		y(2,9)	Real	*SNDBC(1)*	Signal-to-Noise Ratio (dB)		Swerling Case 0-4 (KA 0-4) Swerling Case 0 (KA = 5) SNR (KA = 6)
		y(2,10)	Real	*ATTC(1)*	Tropospheric Attenuation (dB)		Swerling Case 0-4 (KA 0-4) Swerling Case 0 (KA = 5) SNR (KA = 6)
		y(2,11)	Real	*RNGC(1)*	Range (Nautical Miles)		Swerling Case 0-4 (KA 0-4) Swerling Case 0 (KA = 5) SNR (KA = 6)
		y(2,12)	Real	*SNDBC(2)*	Signal-to-Noise Ratio (dB)		Swerling Case 1 (for KA = 5) SNR (KA = 7) *Ignored (KA = 0-4,6)*
		y(2,13)	Real	*ATTC(2)*	Tropospheric Attenuation (dB)		Swerling Case 1 (for KA = 5) SNR (KA = 7) *Ignored (KA = 0-4,6)*
		y(2,14)	Real	*RNGC(2)*	Range (Nautical Miles)		Swerling Case 1 (for KA = 5) SNR (KA = 7) *Ignored (KA = 0-4,6)*
		y(2,15)	Real	*SNDBC(3)*	Signal-to-Noise Ratio (dB)		Swerling Case 2 (for KA = 5) *Ignored for (KA = 0-4,6,7)*
		y(2,16)	Real	*ATTC(3)*	Tropospheric Attenuation (dB)		Swerling Case 2 (for KA = 5) *Ignored for (KA = 0-4,6,7)*
		y(2,17)	Real	*RNGC(3)*	Range (Nautical Miles)		Swerling Case 2 (for KA = 5) *Ignored for (KA = 0-4,6,7)*
		y(2,18)	Real	*SNDBC(4)*	Signal-to-Noise Ratio (dB)		Swerling Case 3 (for KA = 5) *Ignored for (KA = 0-4,6,7)*
		y(2,19)	Real	*ATTC(4)*	Tropospheric Attenuation (dB)		Swerling Case 3 (for KA = 5) *Ignored for (KA = 0-4,6,7)*

		y(2,20)	Real	*RNGC(4)*	Range (Nautical Miles)		Swerling Case 3 (for KA = 5) *Ignored for (KA = 0-4,6,7)*
		y(2,21)	Real	*SNDBC(5)*	Signal-to-Noise Ratio (dB)		Swerling Case 4 (for KA = 5) *Ignored for (KA = 0-4,6,7)*
		y(2,22)	Real	*ATTC(5)*	Tropospheric Attenuation (dB)		Swerling Case 4 (for KA = 5) *Ignored for (KA = 0-4,6,7)*
		y(2,23)	Real	*RNGC(5)*	Range (Nautical Miles)		Swerling Case 4 (for KA = 5) *Ignored for (KA = 0-4,6,7)*
		y(3,n)	Real	RG(n)	75 monotonically increasing values of range, nautical miles, along the ray path from h = 0 to h = 100,000 ft	n=75	Ref.: NRL Report 7461 Radar/Radio Tropospheric Absorption and Noise Temperature - Lamont V. Blake 1972.
		y(4,n)	Real	ATTN(1,n)	75 corresponding decibel radar attenuation values for oxygen	n=75	
		y(5,n)	Real	ATTN(2,n)	75 corresponding decibel radar attenuation values for water vapor	n=75	
		y(6,n)	Real	ATTN(3,n)	75 corresponding decibel radar attenuation values for oxygen plus water vapor	n=75	
		y(7,n)	Real	PP(n)	Standard Atmosphere values for pressure	n=75	
		y(8,n)	Real	TT(n)	Standard Atmosphere values for temperature	n=75	
		y(9,n)	Real	RR(n)	Standard Atmosphere values for water-vapor density	n=75	
		y(10,n)	Real	ALPH(1,n)	Absorption coefficient for oxygen (dB per nautical miles)	n=75	
		y(11,n)	Real	ALPH(2,n)	Absorption coefficient for water vapor (dB per nautical miles)	n=75	
		y(12,n)	Real	ALPH(3,n)	Absorption coefficient for oxygen plus water vapor (dB per nautical miles)	n=75	