Users' Manual

for *AIEM.m*

Contents

1.Introduction

The function *AIEM.m* computes the scattering coefficients from three types of correlation surfaces (Gaussian, exponential, and 1.5-power) using the advanced integral equation model (AIEM). Table 1 and Table 2 lists the descriptions of inputs and outputs. Figure 1 shows the flowchart for the function.

Table 1   Input parameters of AIEM

Parameters	Description
theta_i	incident angle in degree
theta_s	scattering angle in degree
phi_s	scattering azimuth angle in deg
kl	normalized surface correlation length multiplies by wave number k.
ks	normalized surface rms height multiplies by wave number k.
err	the real part of surface relative dielectric constant
eri	the imaginary part of surface relative dielectric constant
itype	itype=1 Gaussian correlation function
	itype=2 exponential correlation function

Table 2 Output parameters of AIEM

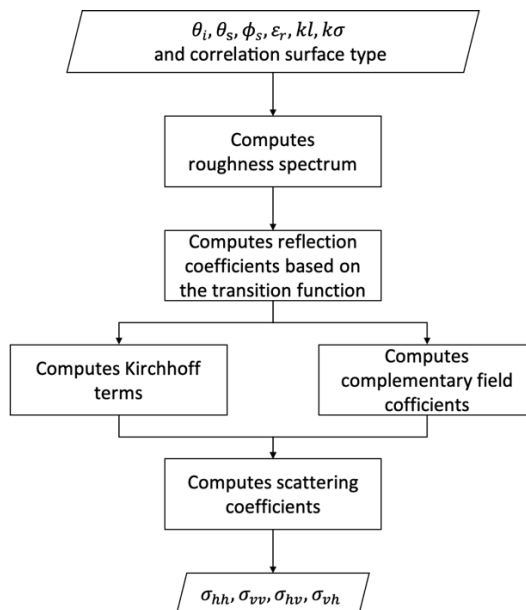| Parameters	Description
HH	scattering coefficient of HH polarization
VV	scattering coefficient of VV polarization
HV	scattering coefficient of HV polarization
VH	scattering coefficient of VH polarization

Figure 1 Flowchart of *AIEM.m*

2.Cases

2.1 Backscattering Case

For both backscattering and bistatic scattering, we set the incident azimuth angle to be $0°$. The inputs for the backscattering case are listed in Table 3. Running the first part of code *cases.m* in this file simulates the backscattering coefficients with the change of incident angle, as shown in Figure 2.

Table 3 Input parameters for Backscattering Case

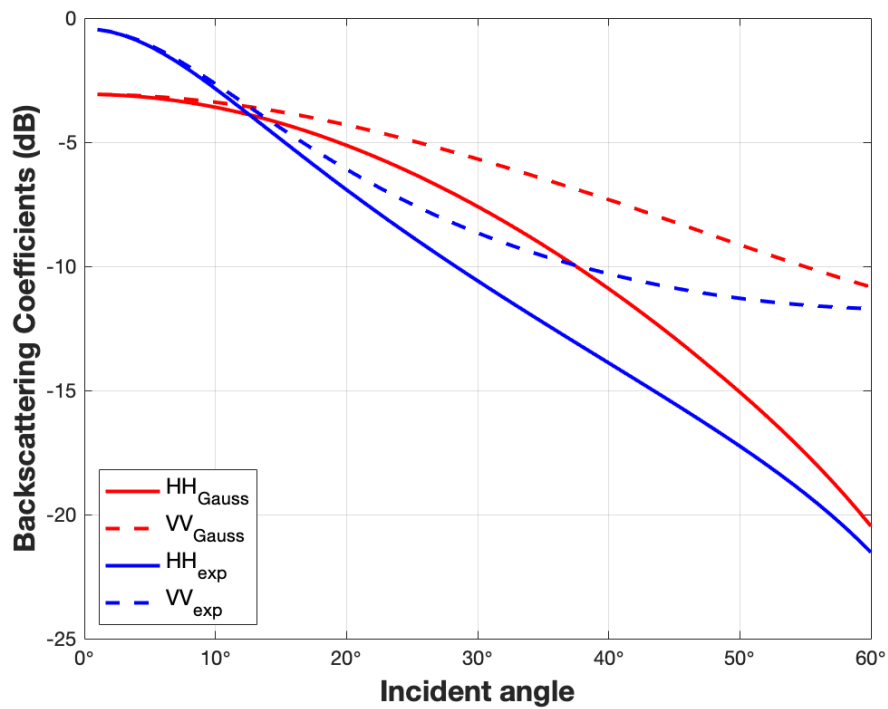| Parameters	Value
theta_i	0°~90°
theta_s	equals to theta_i
phi_s	180°
kl	2
ks	0.4
err	12
eri	1.8
itype	1, 2

Figure 2 The backscattering coefficients changed with the incident angle

2.2 Bistatic Case

Table 4 lists the related inputs for the bistatic case. Figure 3 shows bistatic scattering coefficients as a function of scattering azimuth angle. The second part of *cases.m* is the bistatic case.

Table 4 Input parameters for Backscattering Case

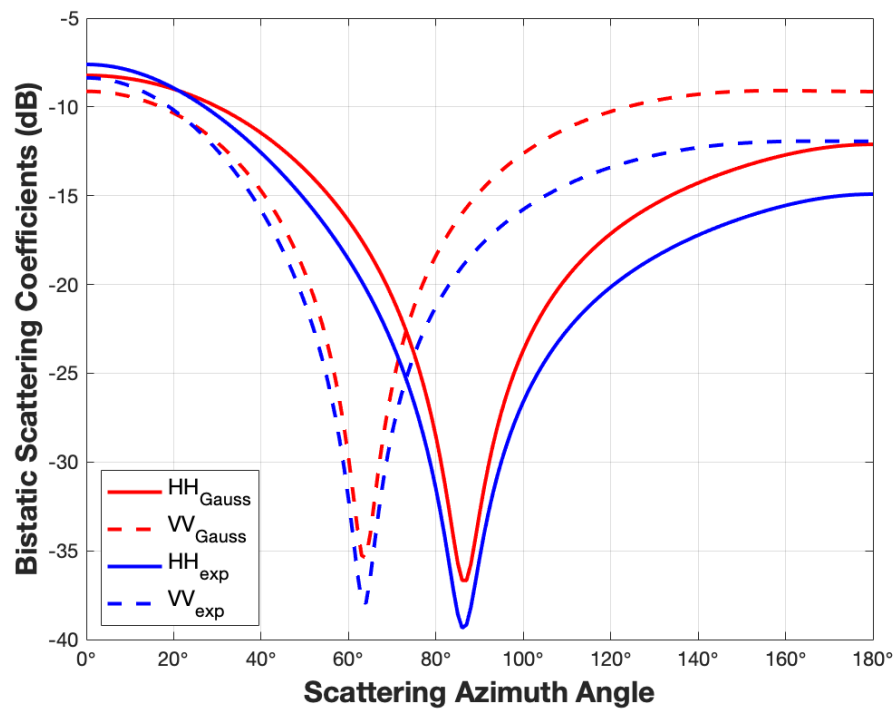| Parameters	Value
theta_i	30°
theta_s	60°
phi_s	0°~180°
kl	2
ks	0.4
err	12
eri	1.8
itype	1, 2

Figure 3 The bistatic coefficients changed with the scattering azimuth angle