moduli_halphin

Computes elastic modulii of a unidirectional lamina using the Halphin and Tsai method

Inputs

Ef - Fiber elastic modulus
Em - Matrix elastic modulus
nuf - Fiber Poisson's ratio
numm - Matrix Poisson's ratio
Vf - Fiber volume fraction
xi - Halphin Tsai reinforcing factor

Outputs

moduli - [E1 E2 nu12 G12]
E1 - Local longitudinal elastic modulus
E2 - Local transverse elastic modulus
nu12 - Local major Poisson's ratio
G12 - Local in-plane shear modulus

Calling the Function

[moduli]=moduli_halphin(Ef,Em,nuf,numm,Vf,xi)

Testing File

Click here to see a testing file for using the function moduli_halphin

Example

Inputs:

Fiber Elastic Modulus: 8.5e+10
Matrix Elastic Modulus: 3.4e+09
Fiber Poisson's ratio: 0.2
Matrix Poisson's ratio: 0.3
Halphin Tsai reinforcing factor for elastic moduli: 2
Halphin Tsai reinforcing factor for shear moduli: 1
Fiber Volume Fraction: 0.6

Outputs:

Lamina Modulii and Poisson's Ratios

Ex	5.236E+10

Ey	1.50571E+10
nuxy	0.24
Gxy	4.59971E+09

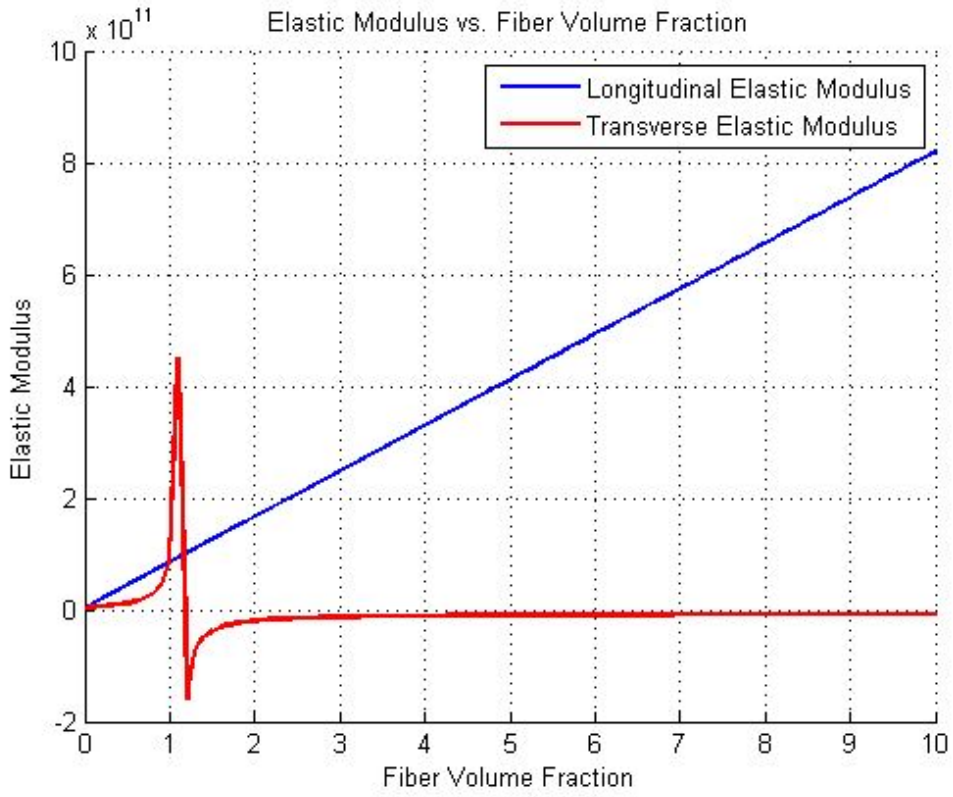
Table:

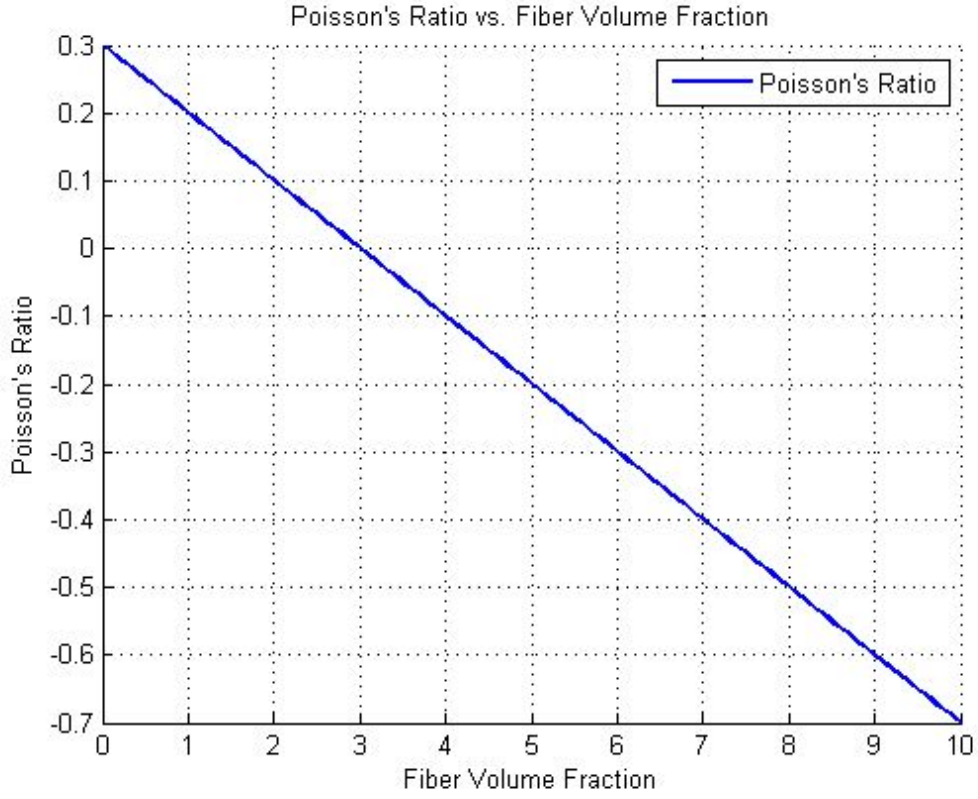
Lamina Modulii and Poisson's Ratios

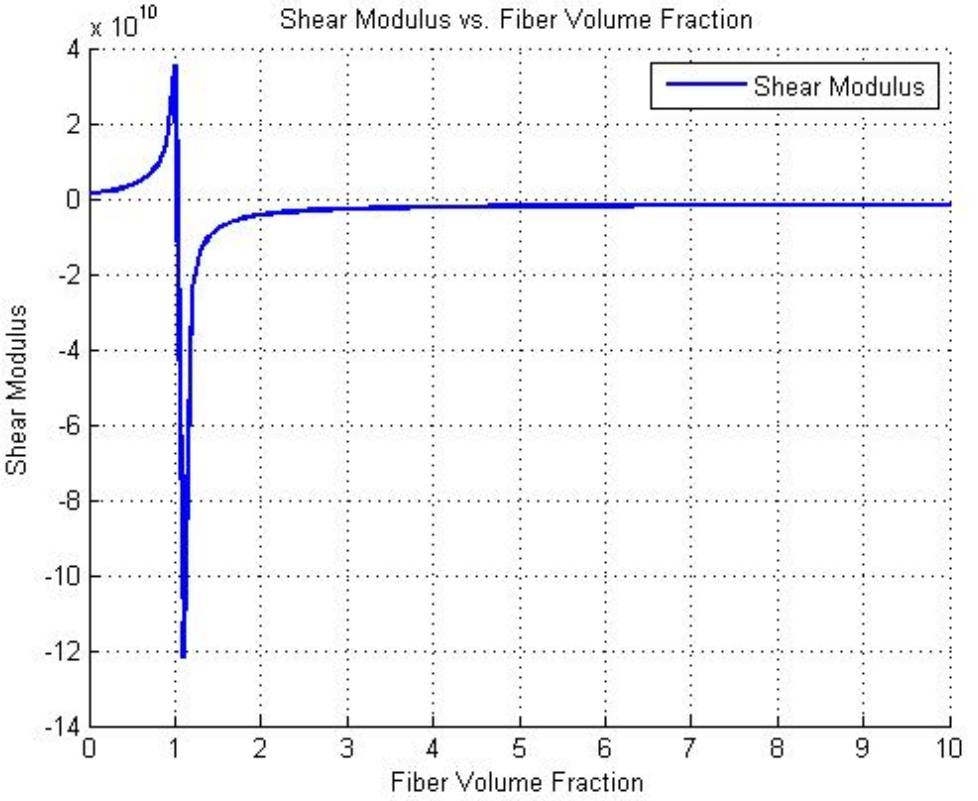
Vf	Ex	Ey	nuxy
0.00	3.4000E+09	3.4000E+09	0.3000
0.10	1.1560E+10	4.3951E+09	0.2900
0.20	1.9720E+10	5.6054E+09	0.2800
0.30	2.7880E+10	7.1091E+09	0.2700
0.40	3.6040E+10	9.0276E+09	0.2600
0.50	4.4200E+10	1.1560E+10	0.2500
0.60	5.2360E+10	1.5057E+10	0.2400
0.70	6.0520E+10	2.0200E+10	0.2300
0.80	6.8680E+10	2.8508E+10	0.2200
0.90	7.6840E+10	4.4200E+10	0.2100
1.00	8.5000E+10	8.5000E+10	0.2000

Gxy
1.3077E+09
1.5755E+09
1.9044E+09
2.3179E+09
2.8537E+09
3.5753E+09
4.5997E+09
6.1680E+09
8.8700E+09
1.4631E+10
3.5417E+10

Graphs:


Elastic Modulus vs. Fiber Volume Fraction
x 10^11
Longitudinal Elastic Modulus
Transverse Elastic Modulus
Elastic Modulus
Fiber Volume Fraction
10
8
6
4
2
0
-2
0
1
2
3
4
5
6
7
8
9
10


Poisson's Ratio vs. Fiber Volume Fraction
Poisson's Ratio
Poisson's Ratio
Fiber Volume Fraction
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
0
1
2
3
4
5
6
7
8
9
10


Shear Modulus vs. Fiber Volume Fraction
x 10^10
Shear Modulus
Shear Modulus
Fiber Volume Fraction
4
2
0
-2
-4
-6
-8
-10
-12
-14
0
1
2
3
4
5
6
7
8
9
10

Description

Outputs elastic modulii and Poisson's ratio of a unidirectional lamina in matrix form: [E1 E2 nu12 G12]