QbarSbarinvariant

Computes the transformed reduced stiffness matrix and the transformed compliance matrix for a unidirectional lamina using invariant methods

Inputs

angle - Angle of ply in degrees
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

Outputs

[Qbar] - Transformed reduced stiffness matrix
[Sbar] - Transformed compliance matrix

Calling the Function

```
[Qbar,Sbar]=QbarSbarinvariant(angle,moduli)
```

Testing File

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

Example

Inputs:

```
Longitudinal Elastic Modulus: 181
Transverse Elastic Modulus: 10.3
Poisson's Ratio: 0.28
Shear Modulus: 7.17
Angle of Lamina: 60
```

Outputs:

Transformed Reduced Stiffness Matrix

23.6468	32.4626	20.0535
32.4626	109.3792	54.1930
20.0535	54.1930	36.7356

Transformed Compliance Matrix

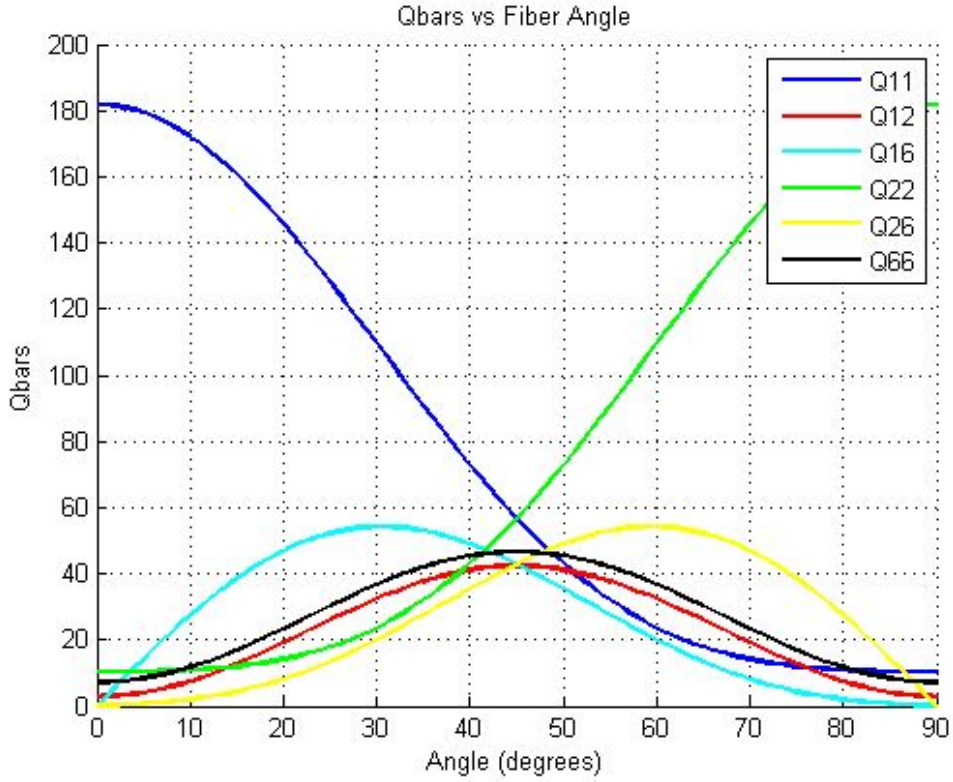
0.0805	-0.0079	-0.0323
-0.0079	0.0347	-0.0470
-0.0323	-0.0470	0.1141

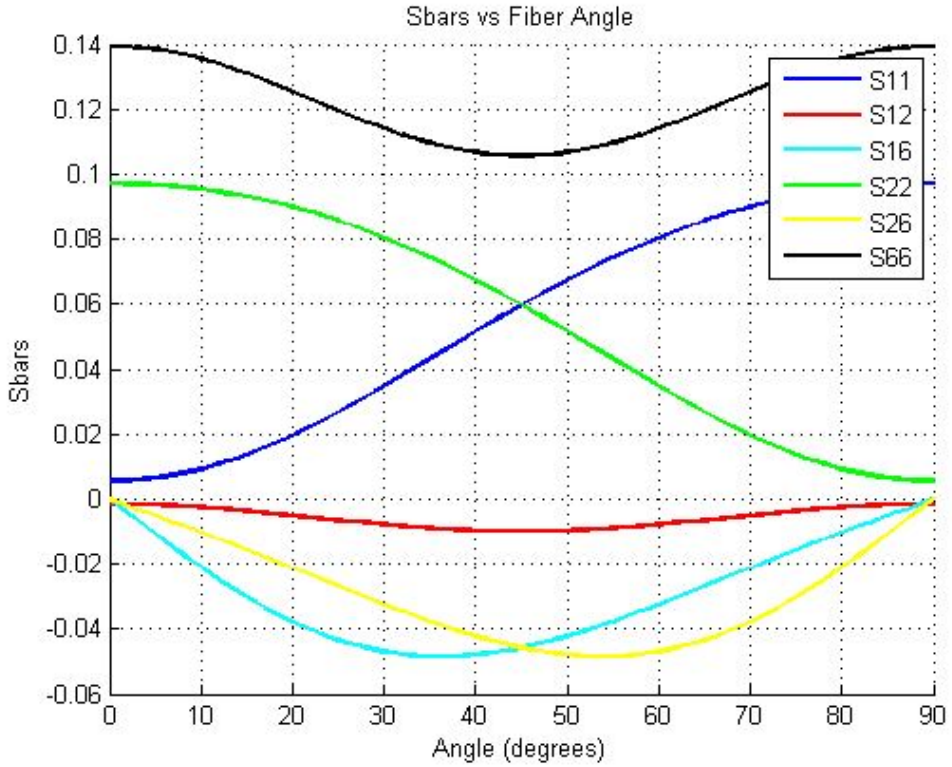
Table:

Transformed Reduced Stiffness Matrix

angle	Qbar11	Qbar12	Qbar16	Qbar22	Qbar26	Qbar66
0	1.818111E+02	2.896924E+00	0.000000E+00	1.034616E+01	0.000000E+00	7.170000E+00
5	1.793200E+02	4.085609E+00	1.418501E+01	1.045994E+01	7.022809E-01	8.358684E+00
10	1.720295E+02	7.508289E+00	2.733074E+01	1.090510E+01	1.991498E+00	1.178136E+01
15	1.604699E+02	1.275214E+01	3.850286E+01	1.197692E+01	4.363388E+00	1.702522E+01
20	1.454658E+02	1.918468E+01	4.696488E+01	1.411600E+01	8.142906E+00	2.345775E+01
25	1.280533E+02	2.603004E+01	5.224843E+01	1.783775E+01	1.342646E+01	3.030311E+01
30	1.093792E+02	3.246257E+01	5.419299E+01	2.364676E+01	2.005352E+01	3.673565E+01
35	9.059139E+01	3.770642E+01	5.295072E+01	3.194691E+01	2.761147E+01	4.197950E+01
40	7.273376E+01	4.112910E+01	4.895637E+01	4.295918E+01	3.547365E+01	4.540218E+01
45	5.665779E+01	4.231779E+01	4.286625E+01	5.665779E+01	4.286625E+01	4.659086E+01
50	4.295918E+01	4.112910E+01	3.547365E+01	7.273376E+01	4.895637E+01	4.540218E+01
55	3.194691E+01	3.770642E+01	2.761147E+01	9.059139E+01	5.295072E+01	4.197950E+01
60	2.364676E+01	3.246257E+01	2.005352E+01	1.093792E+02	5.419299E+01	3.673565E+01
65	1.783775E+01	2.603004E+01	1.342646E+01	1.280533E+02	5.224843E+01	3.030311E+01
70	1.411600E+01	1.918468E+01	8.142906E+00	1.454658E+02	4.696488E+01	2.345775E+01
75	1.197692E+01	1.275214E+01	4.363388E+00	1.604699E+02	3.850286E+01	1.702522E+01
80	1.090510E+01	7.508289E+00	1.991498E+00	1.720295E+02	2.733074E+01	1.178136E+01
85	1.045994E+01	4.085609E+00	7.022809E-01	1.793200E+02	1.418501E+01	8.358684E+00
90	1.034616E+01	2.896924E+00	0.000000E+00	1.818111E+02	0.000000E+00	7.170000E+00

Graph:


Qbars vs Fiber Angle
Qbars
Angle (degrees)
Q11
Q12
Q16
Q22
Q26
Q66
0
20
40
60
80
100
120
140
160
180
200
0
10
20
30
40
50
60
70
80
90


Sbars vs Fiber Angle
Sbars
Angle (degrees)
S11
S12
S16
S22
S26
S66
-0.06
-0.04
-0.02
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0
10
20
30
40
50
60
70
80
90

Description

Outputs the transformed reduced stiffness matrix and the transformed compliance matrix for a unidirectional lamina using invariant methods