a
Mean curvature
0.506
0.505
0.504
0.503
0.502
0.501
0.500
0.499
0.498
0.497
-0.15
-0.10
-0.05
0.00
0.05
0.10
Gaussian curvature
b
Mean curvature
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-0.4
-2
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5
Gaussian curvature
c
Principal curvature
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
Circumferential direction
Axial direction
0
π
2π
Axial coordinate, v
d
Filament bending energy (kT)
200
175
150
125
100
75
50
25
0
Axial direction
Circumferential direction
0
π
2π
Axial coordinate, v