Characterization of a 3-D Photonic Crystal Structure Using Port and S-Parameter Analysis

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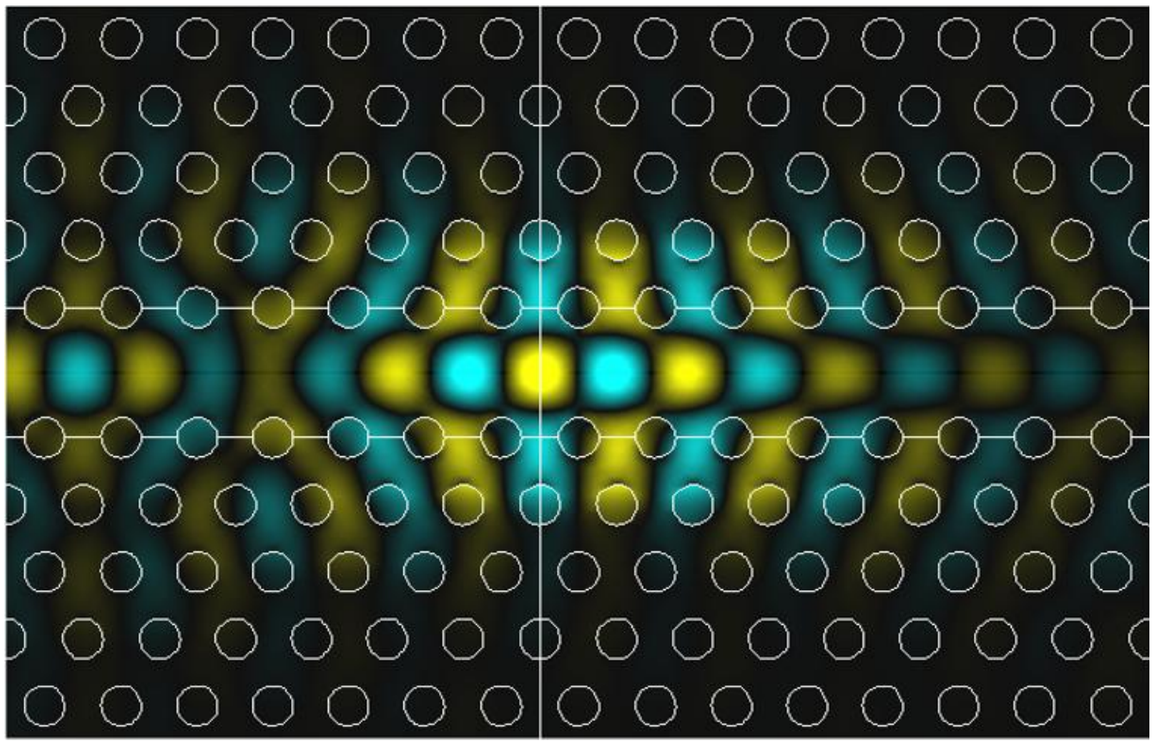

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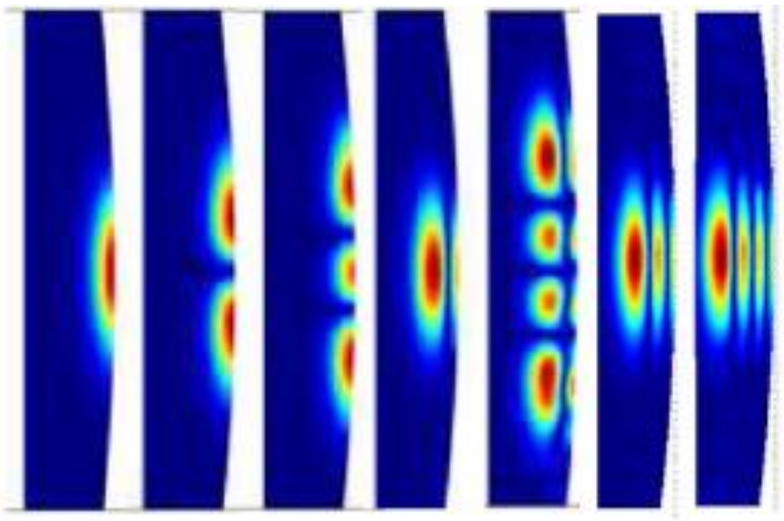
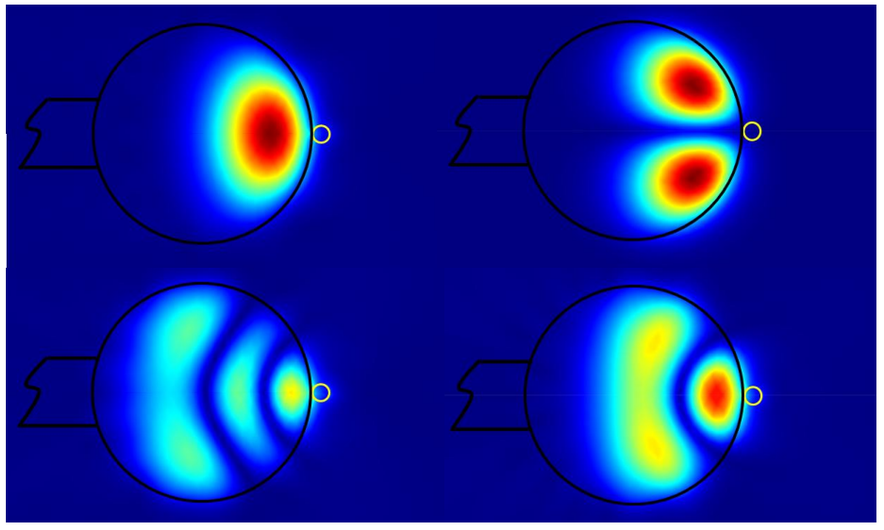
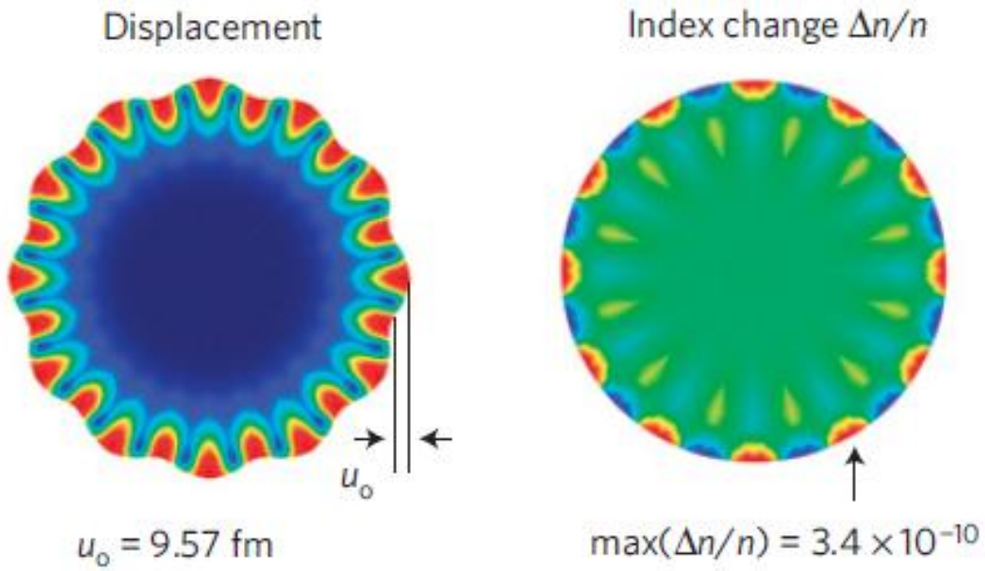
Background

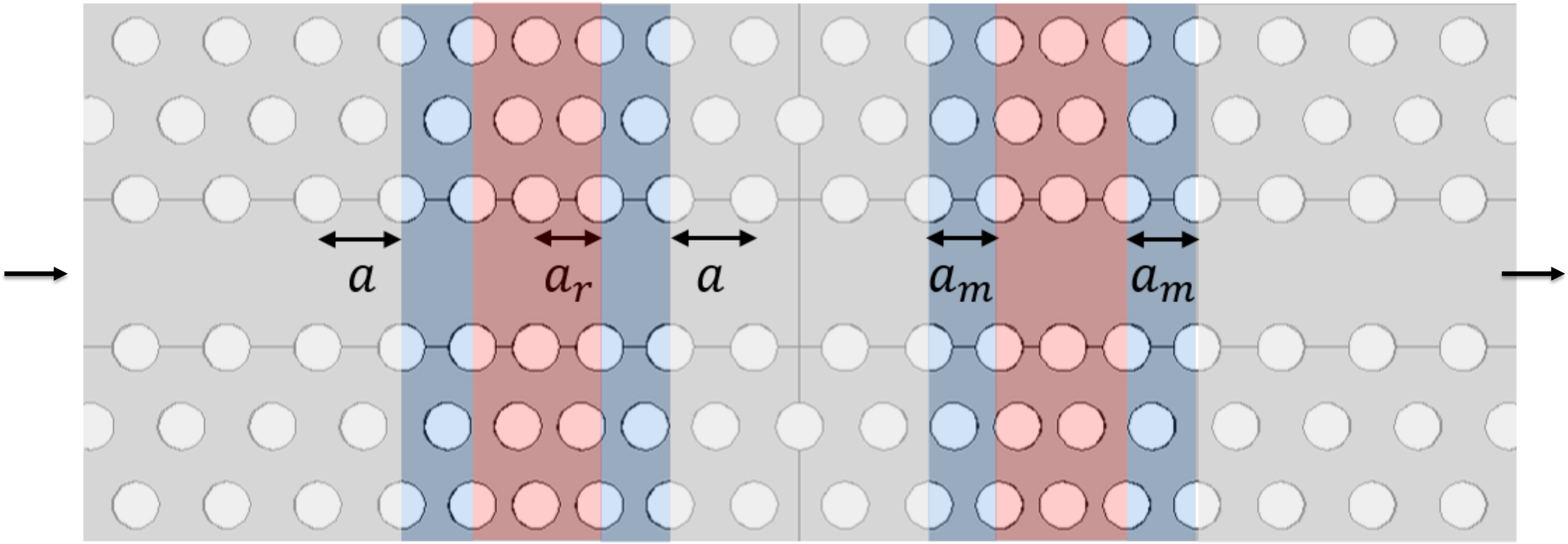




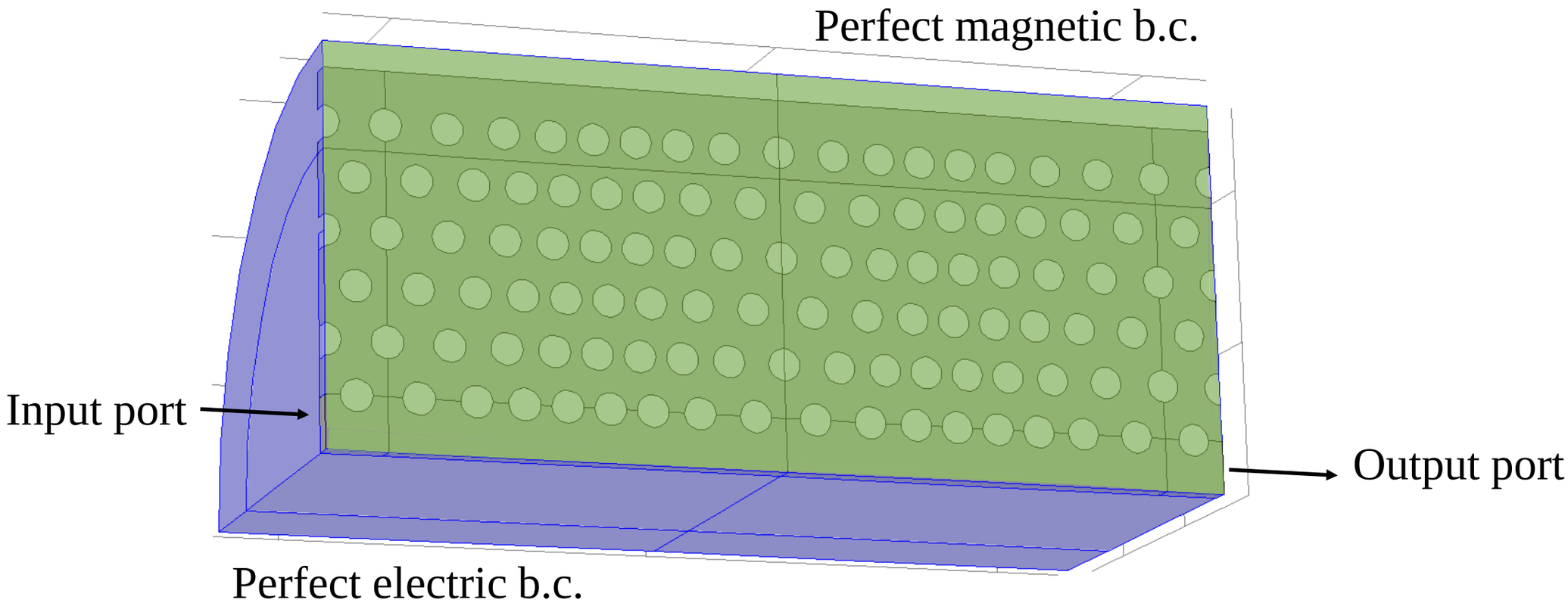


M. Tomes, T. Carmon, Photonic micro-electromechanical systems vibrating at X-band (11GHz) rates, *Phys. Rev. Let.*, **102(11)**, 113601 (2009)
G. Bahl et al., Observation of spontaneous Brillouin cooling, *Nature Physics*, **8(3)**, 203-207 (2012)

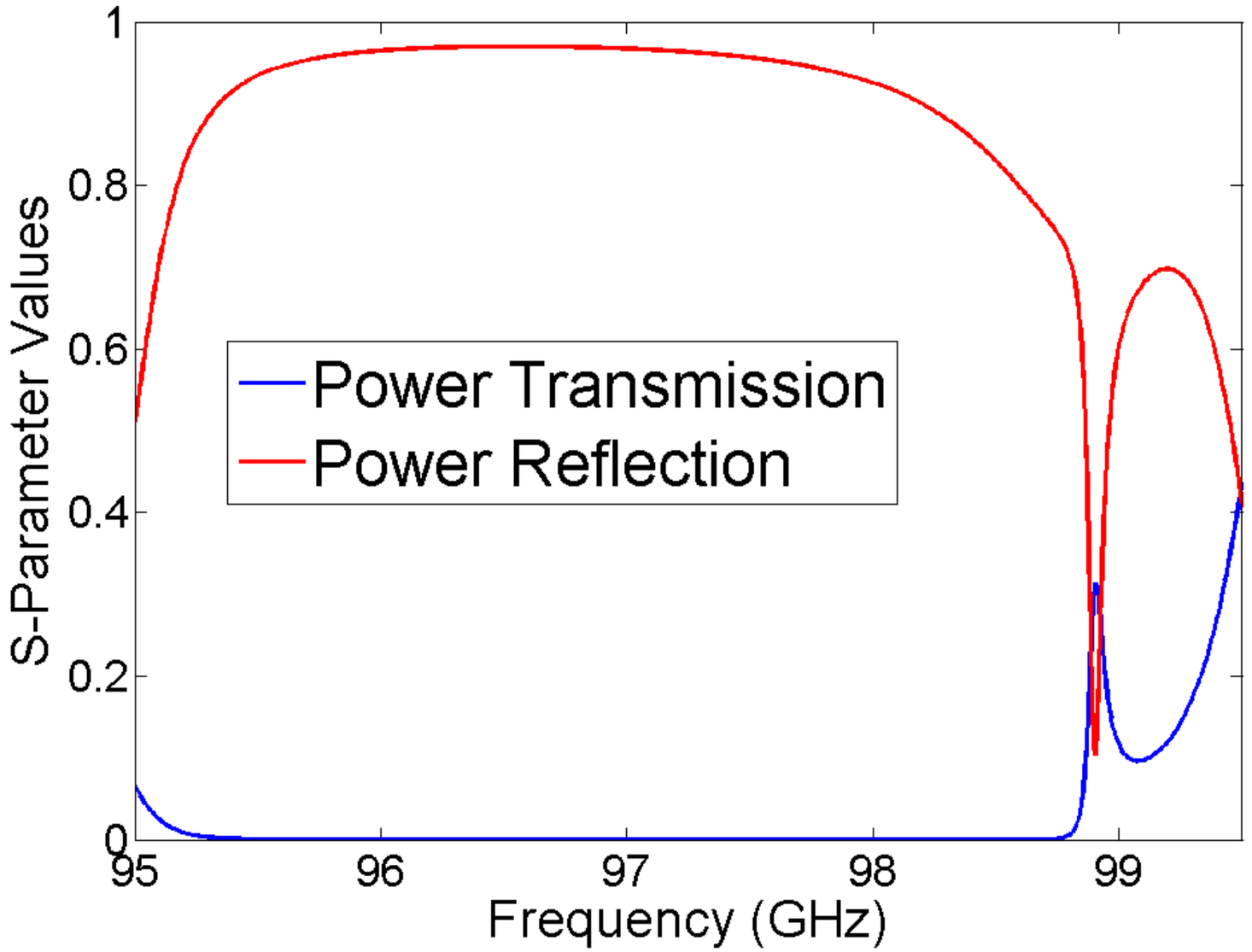
Geometry



Boundary Conditions



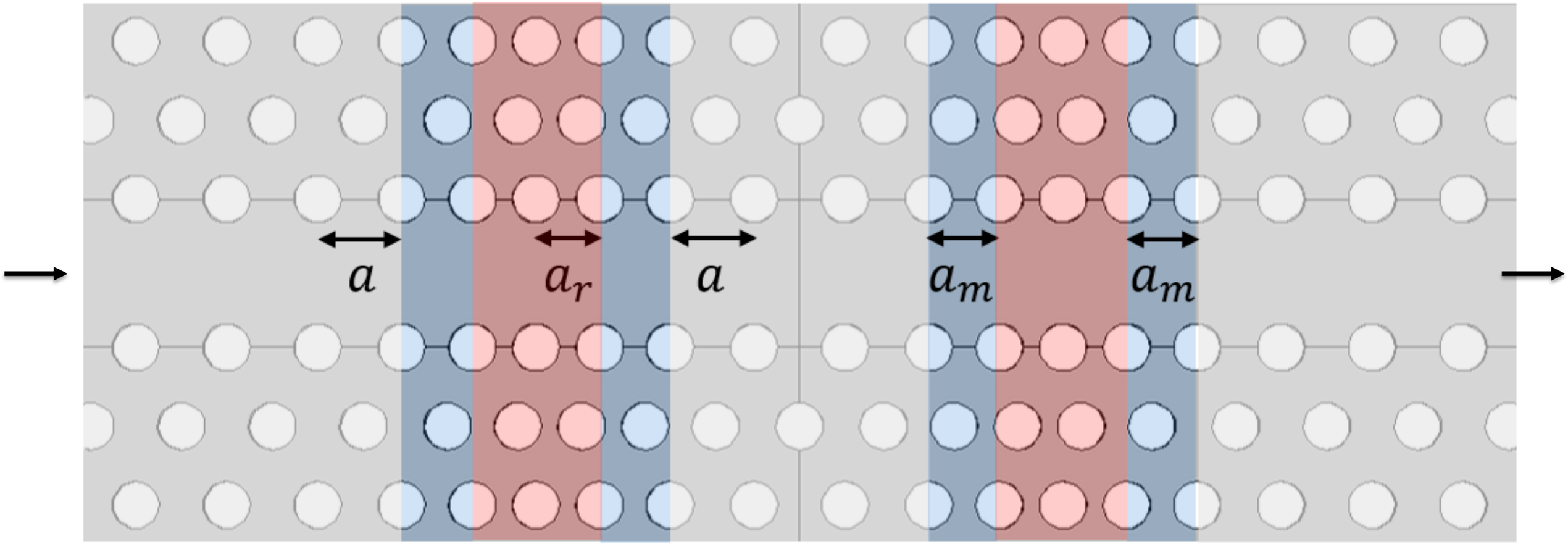
Results


S-Parameter Values
Frequency (GHz)
Power Transmission
Power Reflection
0
0.2
0.4
0.6
0.8
1
95
96
97
98
99

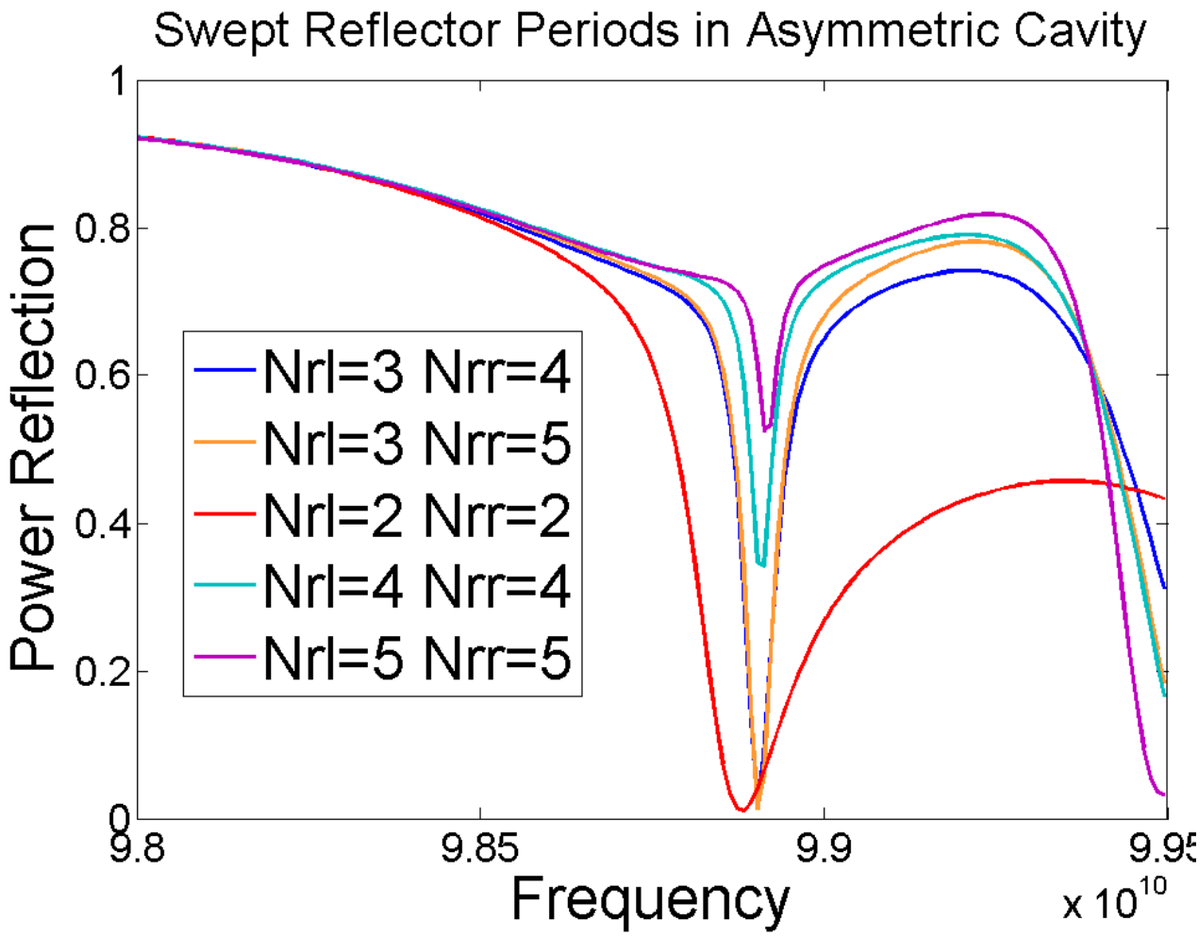
Geometry

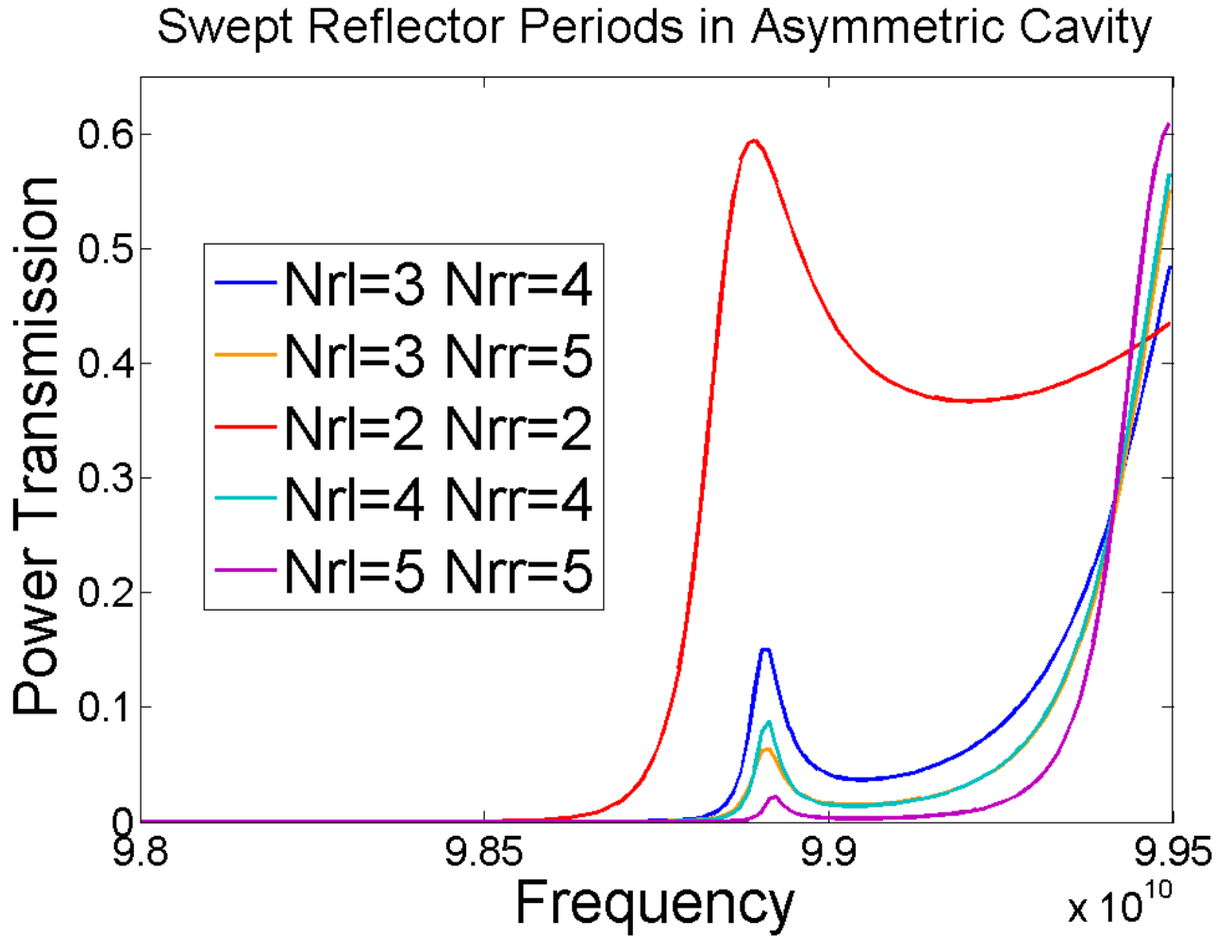
Nrl

Nrr

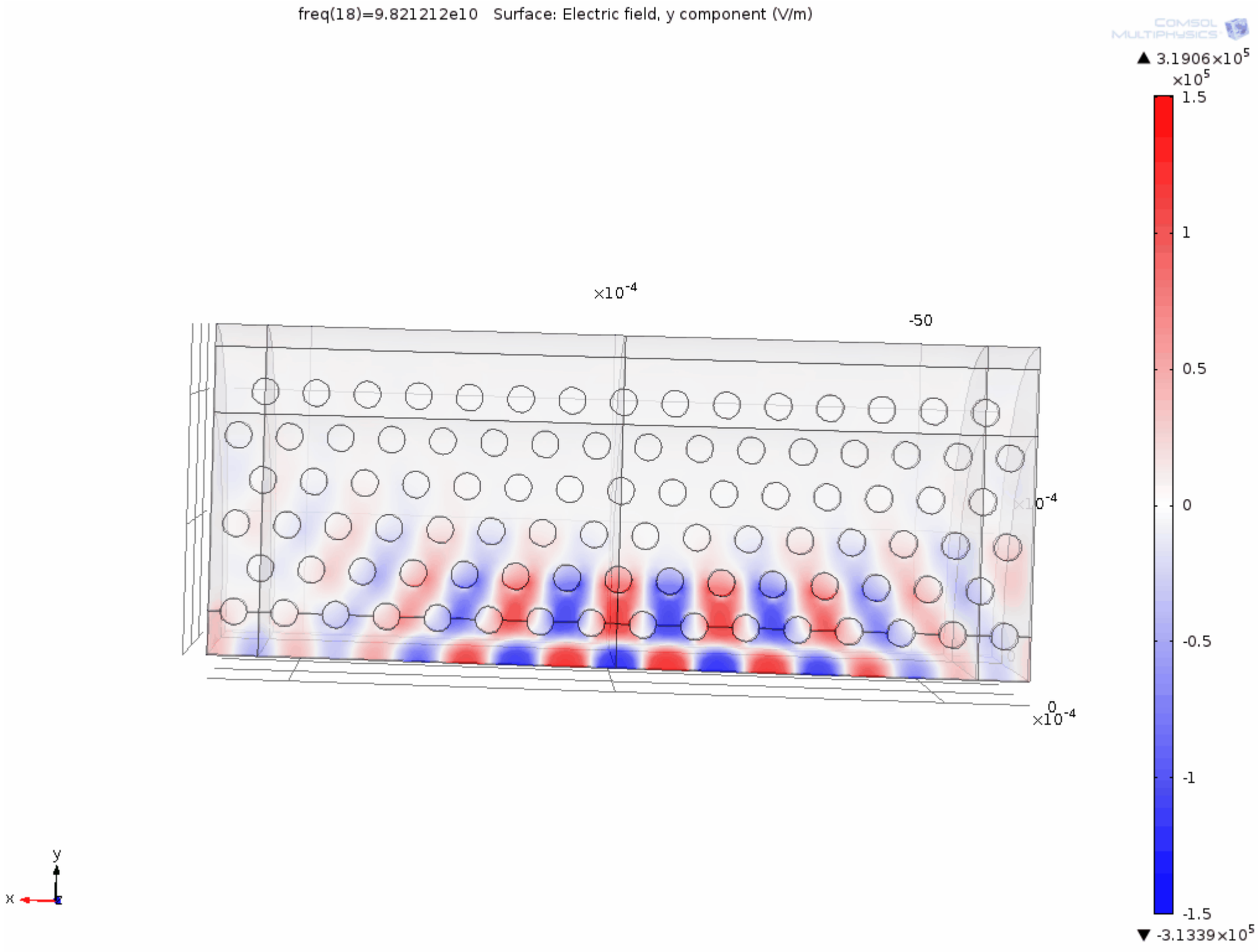


Results

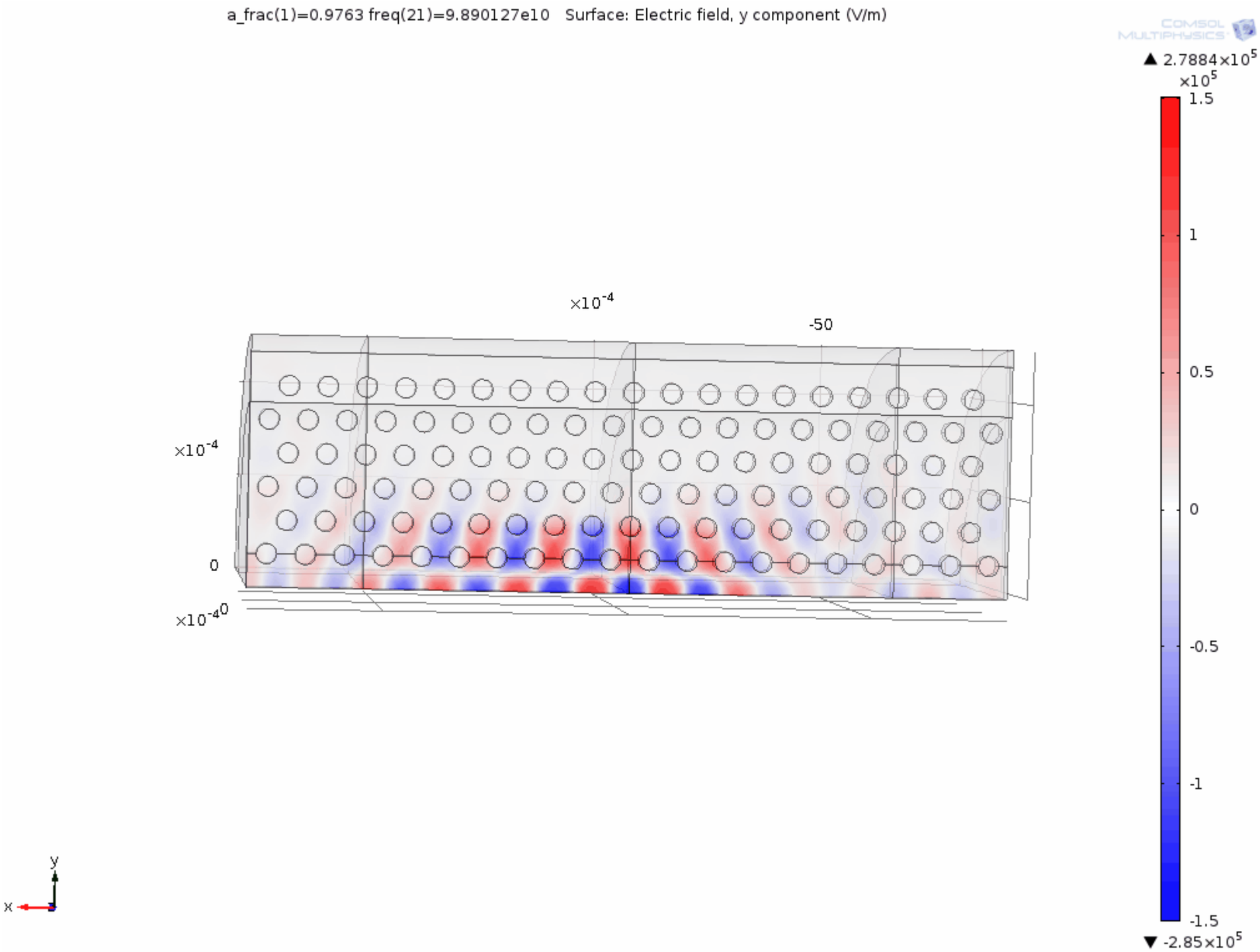

Swept Reflector Periods in Asymmetric Cavity
Power Reflection
Frequency
x 10^10
Nrl=3 Nrr=4
Nrl=3 Nrr=5
Nrl=2 Nrr=2
Nrl=4 Nrr=4
Nrl=5 Nrr=5
1
0.8
0.6
0.4
0.2
0
9.8
9.85
9.9
9.95


Swept Reflector Periods in Asymmetric Cavity
Power Transmission
Frequency
x 10^10
Nrl=3 Nrr=4
Nrl=3 Nrr=5
Nrl=2 Nrr=2
Nrl=4 Nrr=4
Nrl=5 Nrr=5
0.6
0.5
0.4
0.3
0.2
0.1
0
9.8
9.85
9.9
9.95

Results – Animation without cavity



Results – Animation with cavity



Future Work

- Optimizing the input field profile
- External coupling into photonic crystal waveguide
- Fabrication and testing of devices

Acknowledgements

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We would also like to acknowledge the University of Michigan
for their software support and services.

National Science Foundation
WHERE DISCOVERIES BEGIN

Questions?