

Spring 2009 18.369

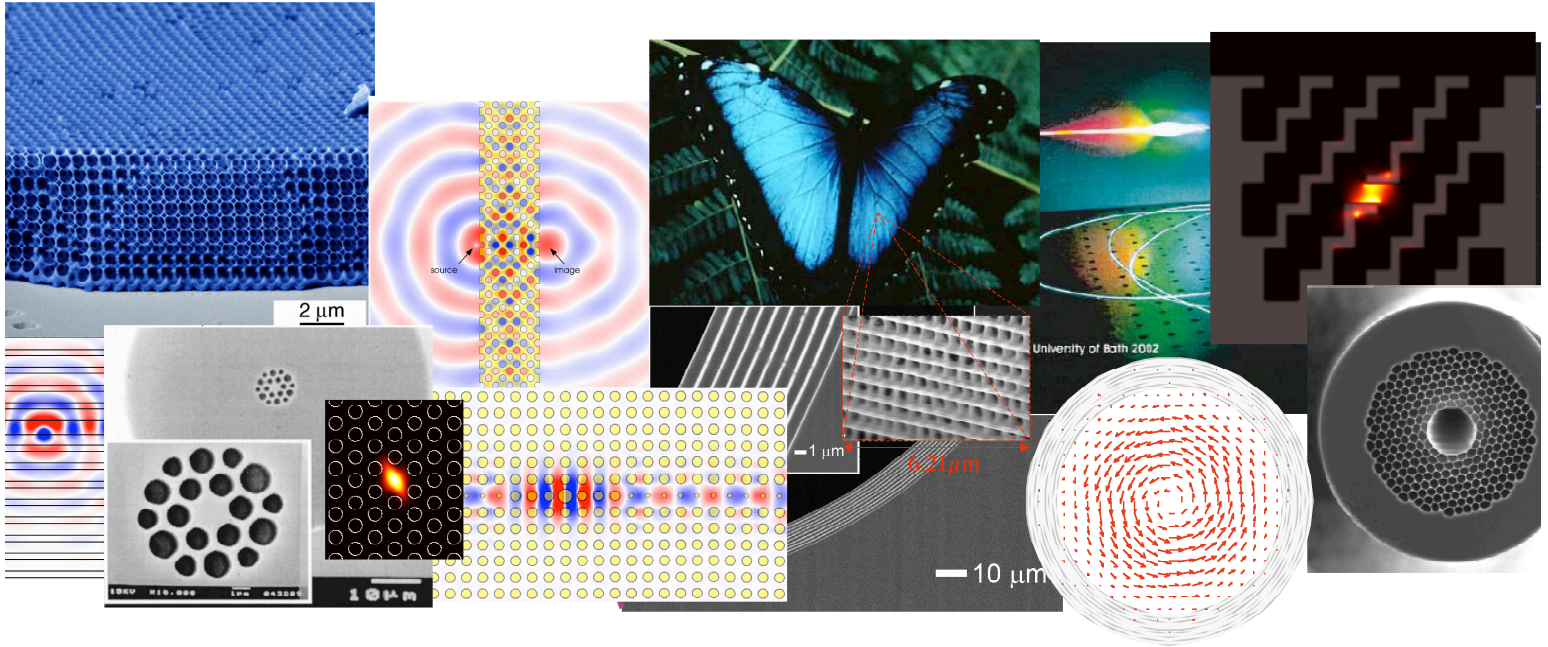
Mathematical Methods in Nanophotonics

Prof. Steven G. Johnson (stevenj@math.mit.edu)

Lecture (2-102): MWF 2–3pm

Office Hours (2-388): TR 4:30–5:30pm

<http://math.mit.edu/~stevenj/18.369>



Syllabus

Probable topics: *Methods:* linear algebra & eigensystems for Maxwell's equations, symmetry groups and representation theory, Bloch's theorem, numerical eigensolver methods, time and frequency-domain computation, perturbation theory, coupled-mode theories, waveguide theory, adiabatic transitions. *Optical phenomena:* photonic crystals & band gaps, anomalous diffraction, mechanisms for optical confinement, optical fibers (new & old), nonlinearities, integrated optical devices.

Grading: 33% problem sets (weekly/biweekly). 33% mid-term exam (April 6). 34% final project (proposal due April 13, project due May 13).

Books: *Photonic Crystals: Molding the Flow of Light*, 2nd edition (online at ab-initio.mit.edu/book). Useful (but not required) book in reserve book room: *Group Theory and Its Applications in Physics* by Inui et al.