Nanophotonic Modeling
Lecture 3.11: MEEP: Bent Waveguides

Prof. Peter Bermel
Example: Index-Guided Bend

(set! geometry-lattice (make lattice (size 16 16 no-size)))
(set! geometry (list (make block (center -2 -3.5) (size 12 1 infinity) (material (make dielectric (epsilon 12)))) (make block (center 3.5 2) (size 1 12 infinity) (material (make dielectric (epsilon 12)))))
(set! resolution 10)

• Resulting geometry
  (as shown on right):
Example: Index-Guided Bend

(set! pml-layers (list (make pml (thickness 1.0))))
(set! sources (list (make source (src (make continuous-src (wavelength (* 2 (sqrt 12))) (width 20))) (component Ez) (center -7 -3.5) (size 0 1))))
(run-until 200 (at-beginning output-epsilon) (to-appended "ez" (at-every 0.6 output-efield-z)))
Example: Index-Guided Bend

- Can create movie from this (as shown below):
Example: Index-Guided Bend

(define-param no-bend? false)
(set! geometry (if no-bend?
  (list (make block (center 0 wvg-ycen)
    (size infinity w infinity)
    (material (make dielectric (epsilon 12))))))
  (list (make block (center (* -0.5 pad) wvg-ycen)
    (size (- sx pad) w infinity)
    (material (make dielectric (epsilon 12))))))
(make block (center wvg-xcen (* 0.5 pad))
  (size w (- sy pad) infinity)
  (material (make dielectric (epsilon 12))))))

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(define-param nfreq 100)
(define trans ; transmitted flux
  (add-flux fcen df nfreq
    (if no-bend?
      (make flux-region
          (center (- (/ sx 2) 1.5) wvg-ycen) (size 0 (* w 2)))
      (make flux-region
          (center wvg-xcen (- (/ sy 2) 1.5)) (size (* w 2) 0))))
(define refl ; reflected flux
  (add-flux fcen df nfreq
    (make flux-region
        (center (+ (* -0.5 sx) 1.5) wvg-ycen) (size 0 (* w 2))))
Example: Index-Guided Bend

Transmission, reflection, and loss spectrum for the bend