ITMO University

Computational Physics

1D FDFD

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ITMO UNIVERSITY

1 Aims of the work

Study PEC-PMC cavity modes with methods of finite difference frequency domain

2 Results

2.1 Eigenmodes

Eigenwavelengths theoretically are defined with $\lambda = \frac{4a}{2n+1}$, where n is the mode number and a - cavity size. (further, every mode value is normalized by cavity size(discretization factor)).
Here are shown values of eigenmodes for different discretizations of cavity:

mode	theory	5	10	20	50	100
0	4	4.41	4.20	4.10	4.04	4.02
1	1.33	1.51	1.41	1.37	1.35	1.34
2	0.8	0.96	0.86	0.82	0.81	0.80
3	0.57	0.75	0.63	0.59	0.58	0.57
4	0.44	0.65	0.50	0.46	0.45	0.45

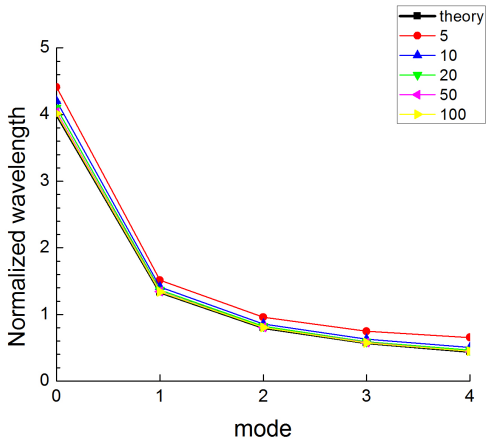

Figure 1: eigenmodes with different discretization

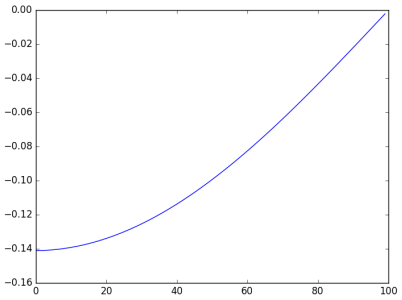

Figure 2: Mode 0

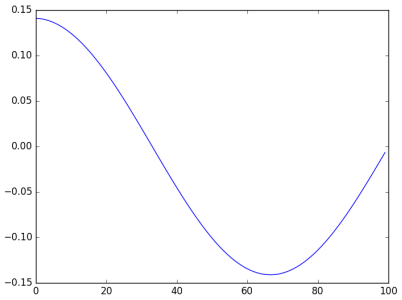

Figure 3: Mode 1

2.2 Field distributions

For 100 units discretization here are shown E-field distributions for modes 0 to 4, respectively.

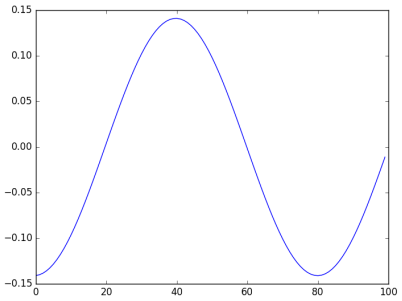

Figure 4: Mode 2

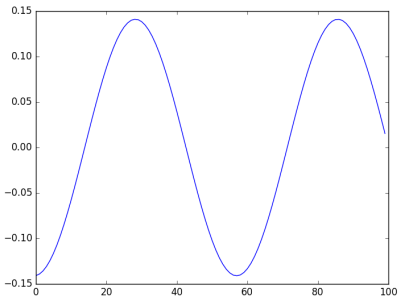

Figure 5: Mode 3

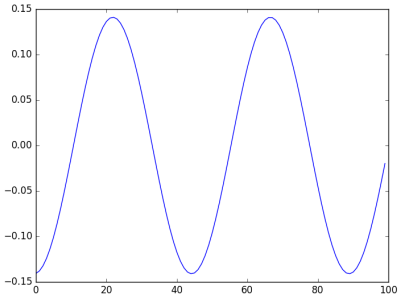

Figure 6: Mode 4