

1 Description of Supplementary Files

2 Four m files, “TM_leakymodes, fdavidenko, fTM, fTMt”, have been added as supplementary
3 files.

4 The leaky modes for circular dielectric rod can be obtained from TM_leakymodes on MATLAB
5 software. The leaky modes for circular dielectric rod with $a=10\text{mm}$ and $\epsilon_r=4$ have been
6 presented on line 216 in the manuscript. Anyone can compute the leaky modes in the frequency
7 region between zero and the cutoff frequency, 6.63 GHz, by using the TM_leakymodes. In
8 order to compute the modes, it is firstly necessary to write a initial guess for the first mode at a
9 certain frequency in the line “`TM01=[5e9 -.98 .05];% [The operating fr. the phase`
10 `const. the attnuation const.]`”. For example, initial guess for the propagation constant
11 is $\gamma = 0.98 + 0.05i$ at $f=5\text{GHz}$, so initial guess for the phase constant is 0.98 and the initial
12 guess for the attenuation constant is 0.05.

13 The line “`for fr=5e9:-.1e9:.1e9 % The operating frequency`” determines the frequency
14 region where the leaky modes will be obtained. For example, the frequency starts 5GHz and
15 finish 100MHz for the description, “`for fr=5e9:-.1e9:.1e9`”.

16 The guided modes where exist above the cutoff frequency can be obtained from the
17 “Open_Boundary_ChaEq_TM”. In order to compute the guided modes, it is only necessary to
18 define the frequency range in the line “`for f=6.7e9:.1e9:15e9`”. For example, the description
19 “`for f=6.7e9:.1e9:15e9`” computes the guided modes the frequency region between 6.7GHz
20 to 15GHz.

21 The CST data could not include as supplementary files because the system cannot support the
22 file format. But they will share if they are required by the reviewers.

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