

2.5 Wave propagation in layered media

Matlab program

The [program](#) simulates the wave transition through several plan-parallel dielectric layers (through several boundaries).

First, the path of Matlab has to be set to the directory **Layers**. The program is run via the m-file [vrstvy](#). Closing the introductory window, you are asked to provide input parameters: the number of media (incl. the input medium and the output one), the central frequency (where the distributions of the electric field intensity and the magnetic one are computed), and the bandwidth (where the frequency course of the reflection coefficient, of the standing wave ratio and of the power transmittance P_{out} / P_{in} are computed).

Confirming the number of layers, the menu for specifying parameters of the media is updated. The user is asked for the length and the dielectric constant of the layer. If a new layer is added, parameters of the previously specified layers are preserved. Pushing the button , the computation is started. In case some parameters are improperly specified, input lines to be corrected are shown in red. Results are displayed in a new window. The user can consequently modify the number of layers and the parameters of layers, and can compare newly computed results with previously calculated ones. Pushing the button , the windows with results can be closed. The button ends the program.

Two charts in a single window graphically represent results. The upper chart displays the distribution of the electric field intensity (blue) and the magnetic one (green). In the last layer, a unitary value of electric field intensity is assumed, and the last layer is expected to be completed by a reflection-free termination (i.e., no reflected wave exists in the last layer on any frequency). The lower chart displays frequency course of reflection coefficient ρ (blue), of transmittance (red), and of standing wave ration (green, the scale on the next axis). If the graphical results are not needed more, the user can return back to the previous window, finish the program, insert new parameters or repeat the calculation.