3DTLM-PIPE and OSA90/hope

(Poman P.M. So and Wolfgang J.R. Hoefer)

The *3dtlm-pipe* interface is a program that make OSA90/hope and 3D-TLM work together seamlessly. It provides a fully parameterized 3D-TLM component library for use in microwave circuit analysis and optimization with OSA90/hope, a commercially available microwave circuit CAD software from Optimization Systems Associates Inc. The user of OSA90/hope does not have to interact with the 3D-TLM server program at all. He or she only has to work with the Datapipe syntax of OSA90/hope.

Currently, the component library of *3dtlm-pipe* includes only three components for the rectangular waveguide environment. They are:

- resonance cavity,
- inductive iris bandpass filter, and
- inductive iris bandpass filter with two tuning screws.

Expanding this library to include more components is an easy task; the prerequisite is a basic knowledge of the 3D-TLM technique and the C++ programming language. The implementation details of the existing rectangular waveguide components and the techniques to expand this library as well as the syntax for using these components in OSA90/hope are given in a research report — *Microwave Circuit Design and Optimization by TLM Time Domain Analysis and OSA90/hope*, which is available upon request from the Chair.

A DECmpp 12000 massively parallel version of the *3dtlm-pipe* software is also available. This version use the UNIX pipe to combine the computing power of a local HP station with a remote parallel computer, Fig. 1. The technical detail of this parallel version is published in *Optimization of Microwave Structures using a Parallel TLM Module*, ACES 94. The dimensions of a waveguide filter is optimized in this paper, and the dimensions and result are shown in Fig. 2 and Fig. 3.

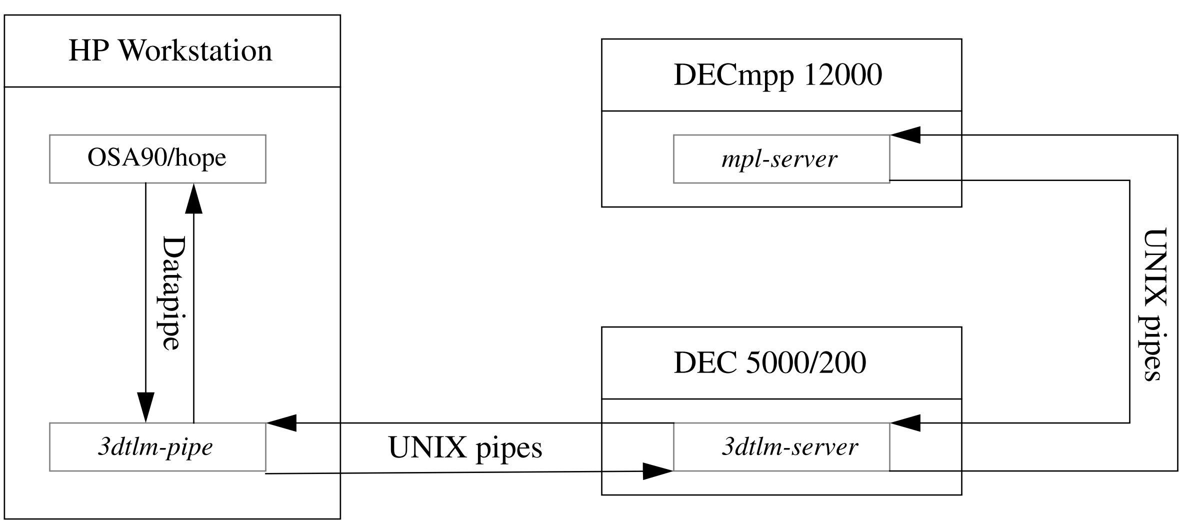
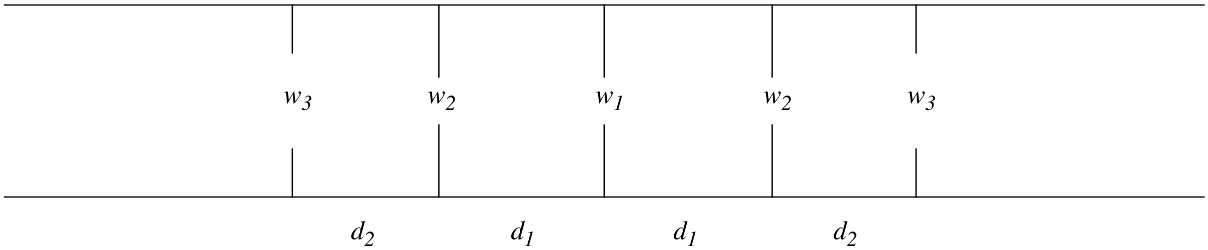
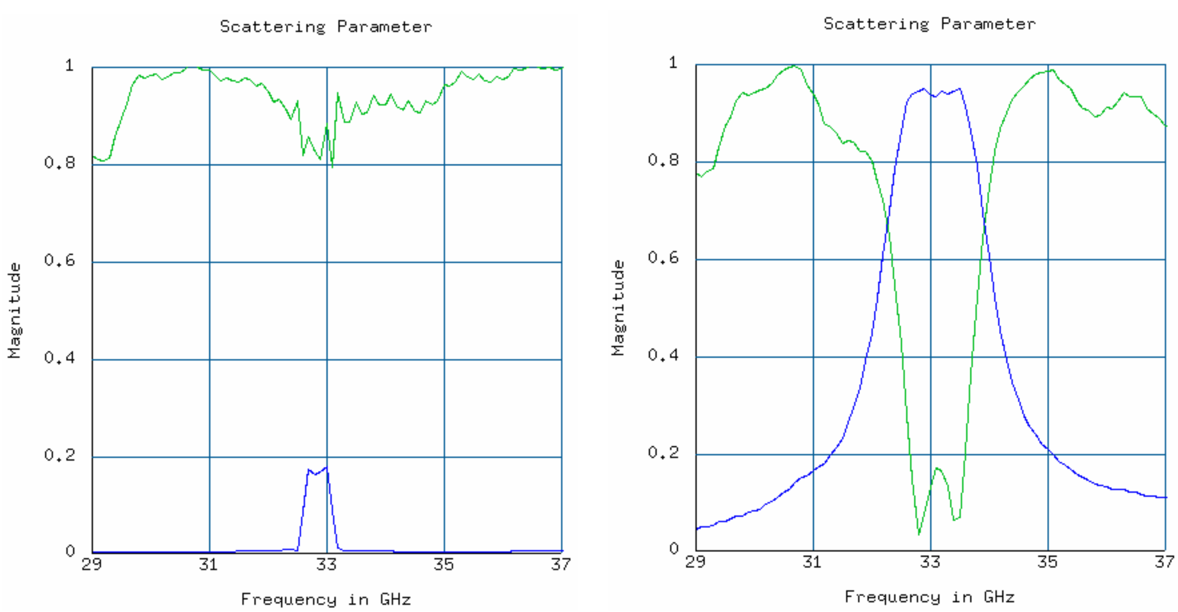


Figure 1 The interaction of OSA90/hope, *3dtlm-pipe*, *3dtlm-server* and *mpl-server.*



	Initial	30 Random	60 Random	90 Random
w_1 in Δl	2	4	4	4
w_2 in Δl	2	4	6	6
w_3 in Δl	2	10	10	10
d_1 in Δl	23	21	21	21
d_2 in Δl	23	23	22	23

Figure 2 The top view of an inductive iris bandpass filter. The initial and successive optimized values of the parameters are show in the above table, Δl=0.508mm. The desired center frequency is 33 GHz; the passband is from 32.5 GHz to 33.5 GHz. The optimization goal is to have minimum $|S_{11}|$ and maximum $|S_{21}|$ in the passband and vice versa in the stopband



(a) (b)

Figure 3 The responses of the inductive iris filter shown in Fig. 2.
(a) The initial response.
(b) The response after 90th simulations with parameter values randomly chosen by the random optimizer of OSA90/hope.