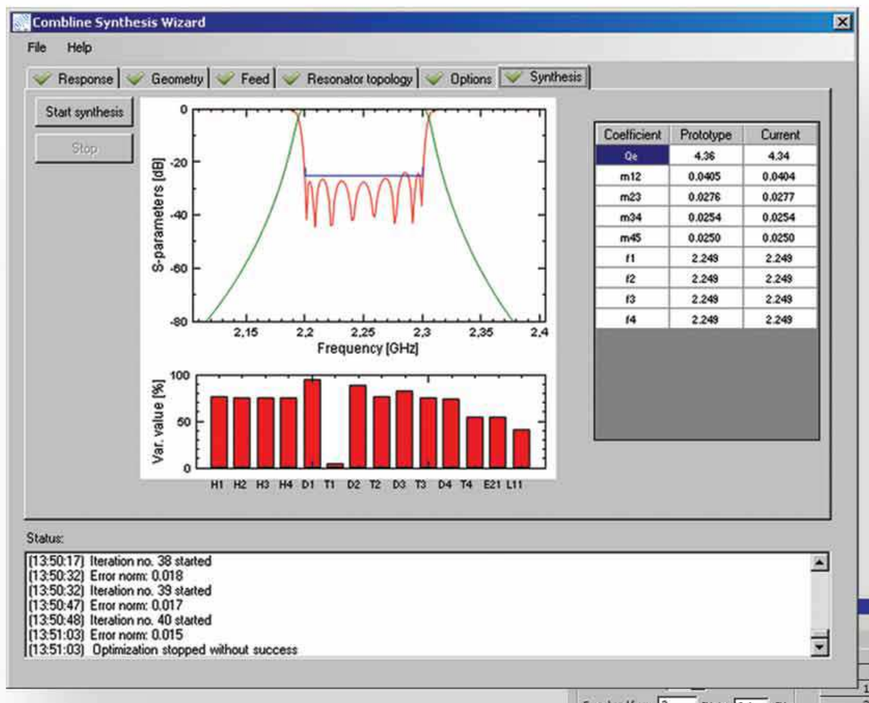
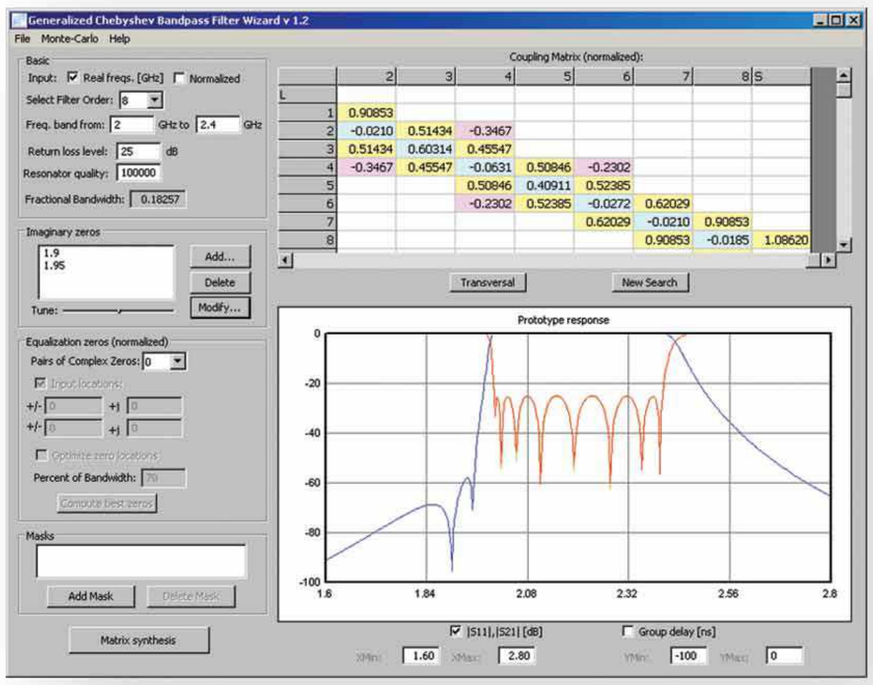
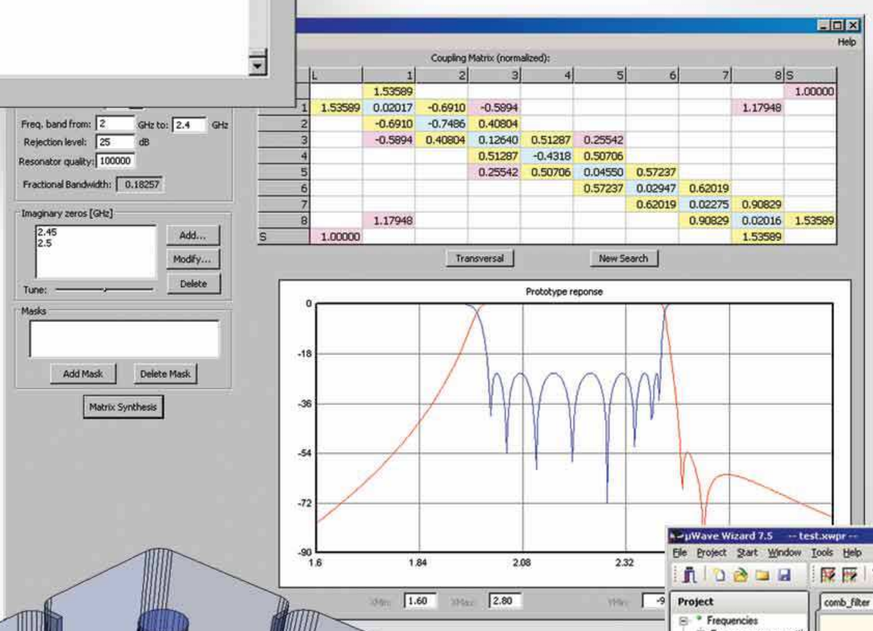
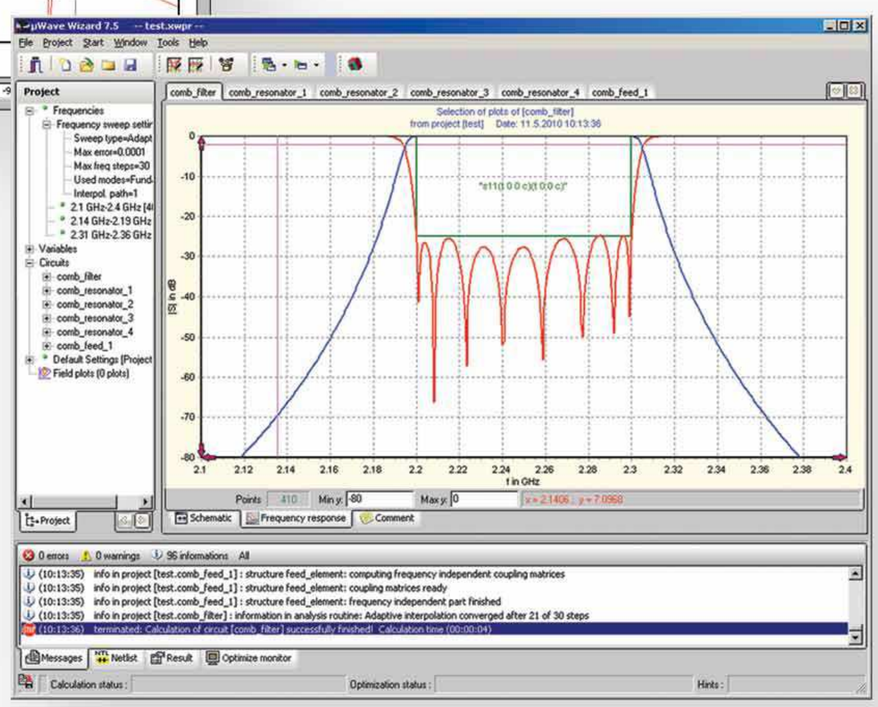
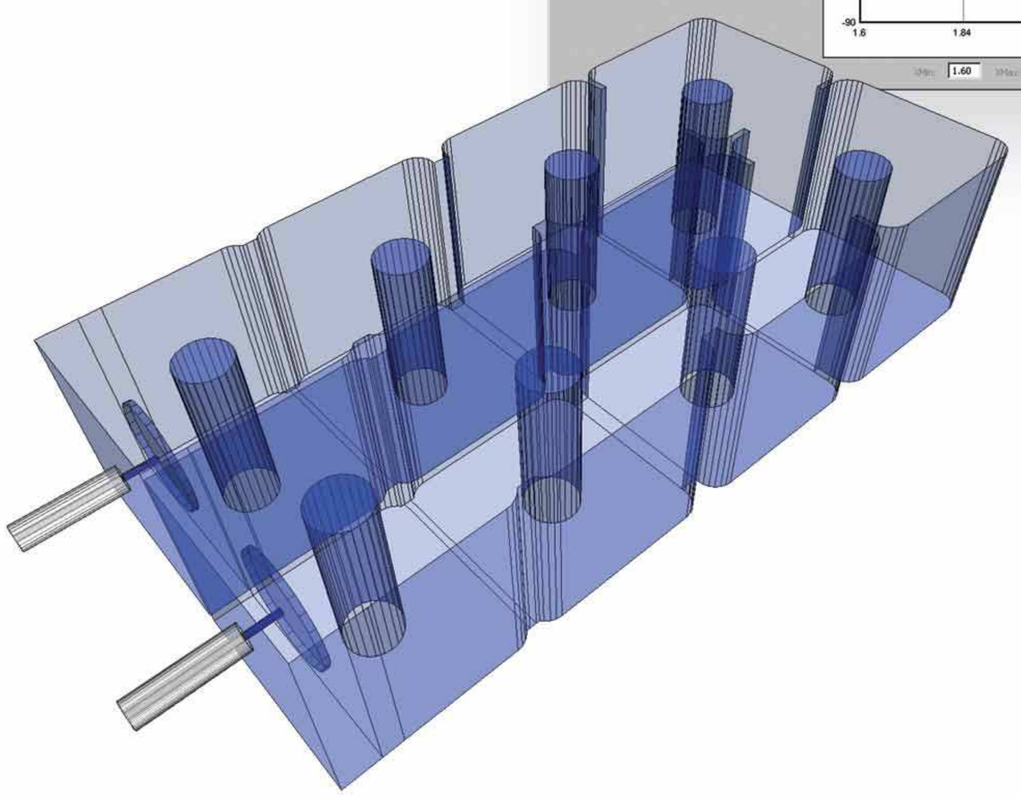
WiComm Tools











Combline Filter Synthesis Wizard for narrow- and broadband filters

The Combline Filters Synthesis Wizard (CFSW) is a revolutionary full-wave design tool that allows an automated fast synthesis and optimization of narrow- and broadband combline pass band filters by using mode-matching technique for the multimodal computation. The simulation is provided by Mician's µWave Wizard. The CFSW uses a novel extremely accurate technique for the synthesis of the coupling coefficients and a new efficient optimization method. As a result a whole design process is based on full-wave analysis and takes into account all electromagnetic effects and higher order couplings. Due to an innovative optimization technique the entire procedure is automated and takes only a few minutes. A complete process starts with the specifications and after a few minutes ends with an optimized, ready to manufacture design.
The filters can be of an inline or folded type. In case a of narrow band filter the cavities are separated by irises whereas each iris can include finite radii for milling purposes. In case of a broadband filter the design consists of posts only.

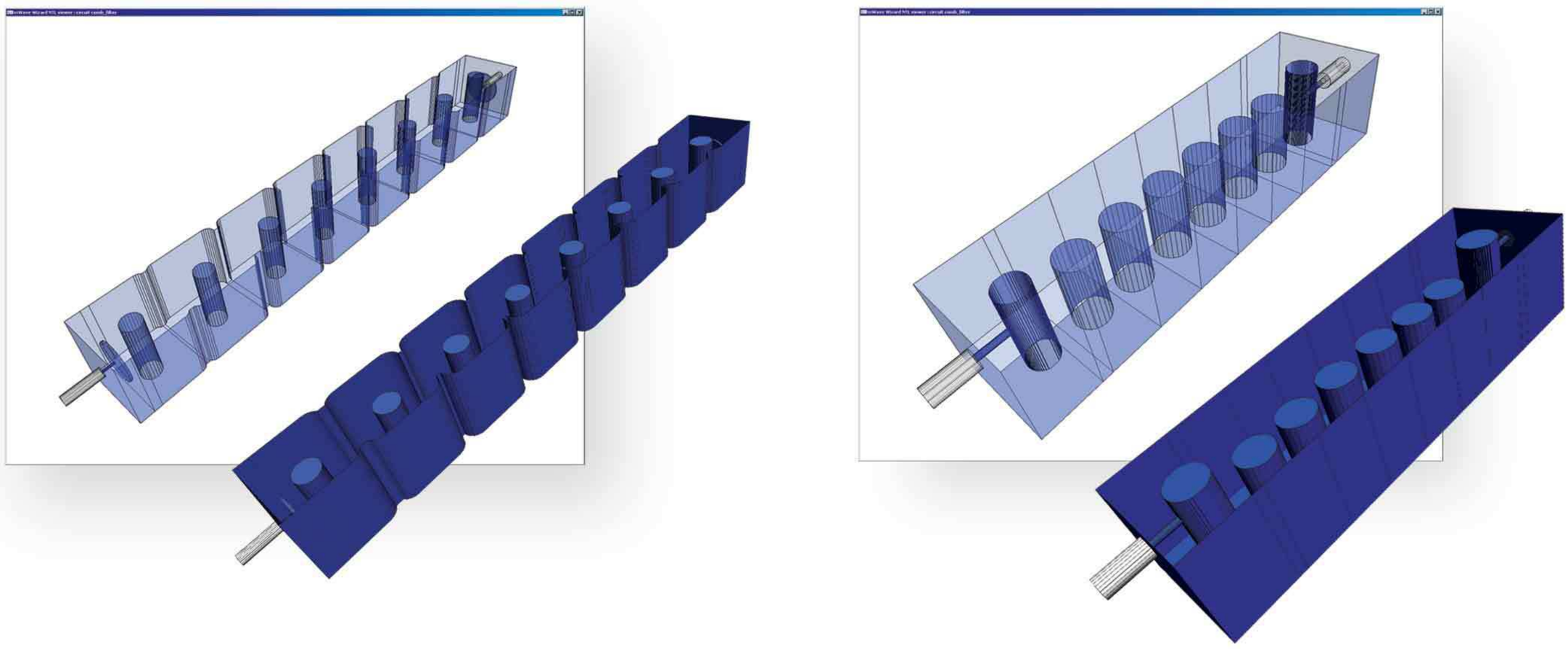


Fig.1. Example of an inline combline filter for narrow and broad band applications.

Synthesis and optimization

On six different tabs within the main window all filter specifications will be set up. Every single tab requires to enter some specific parameters, such as geometry or feed data. Once the entries are completed the respective tab will be tagged with a green check mark.

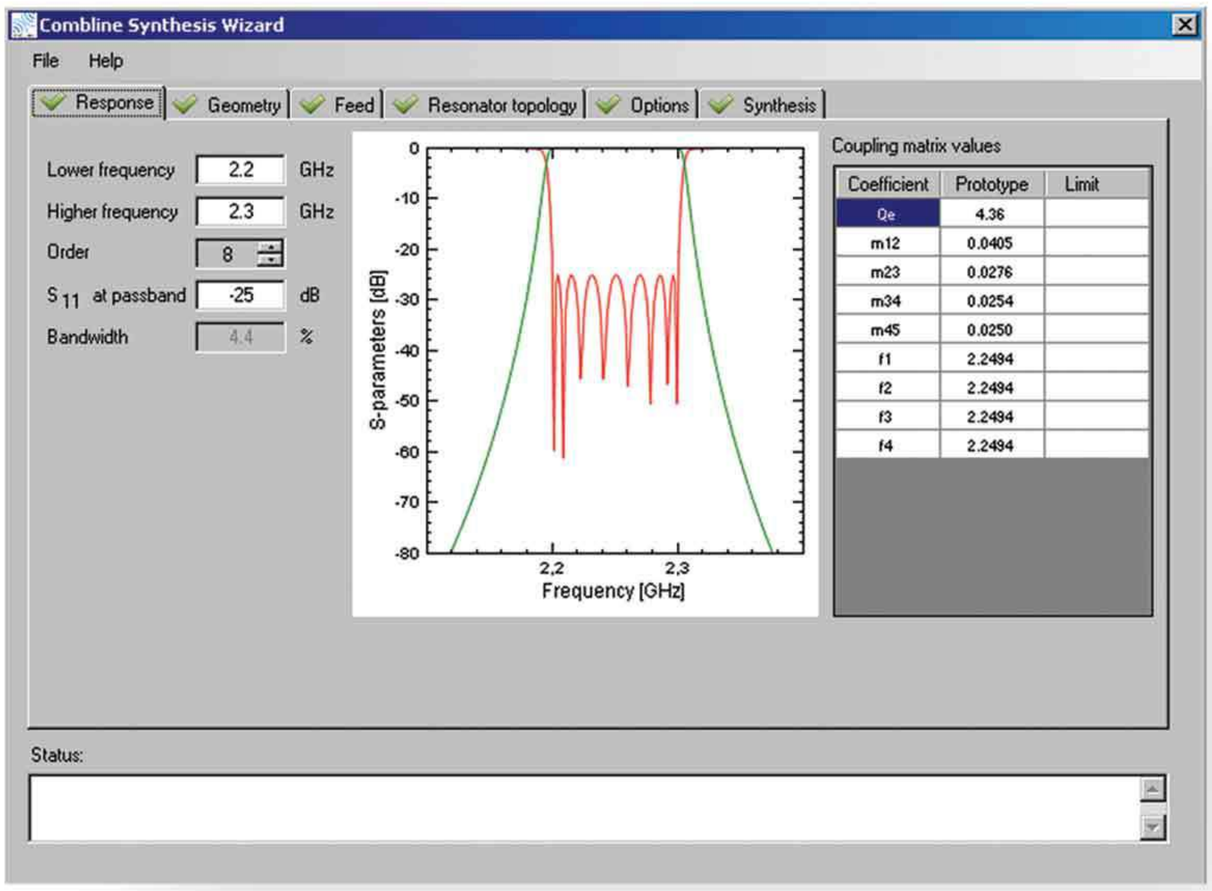
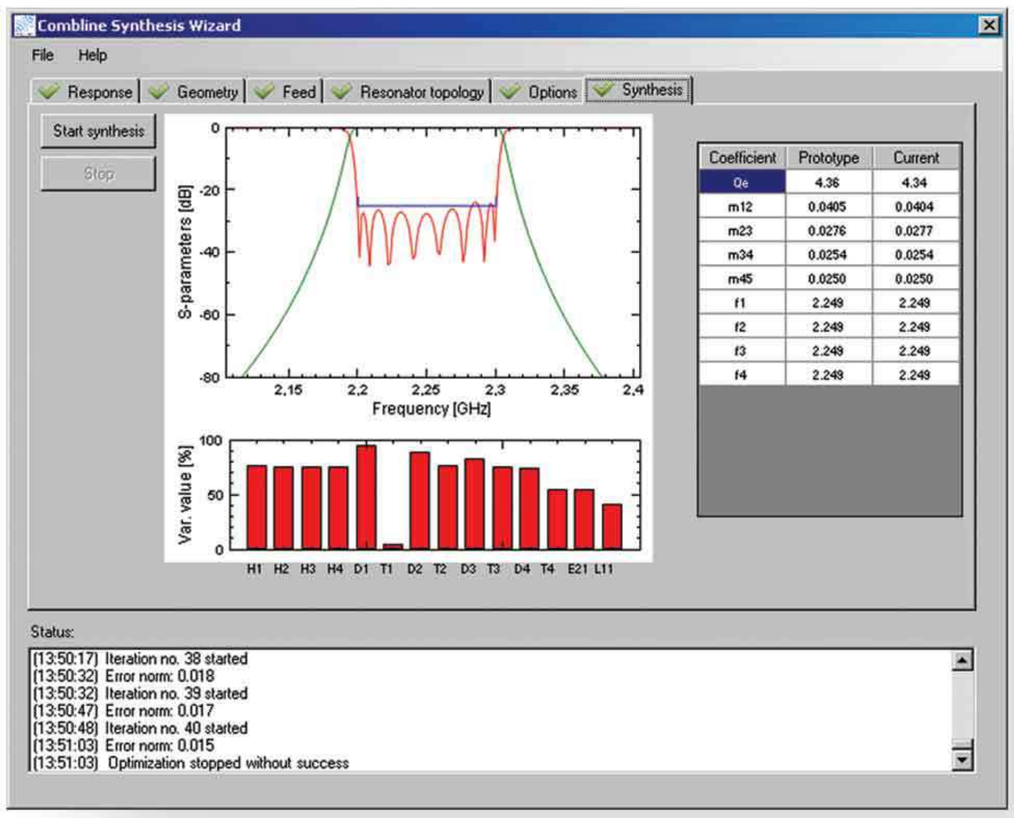
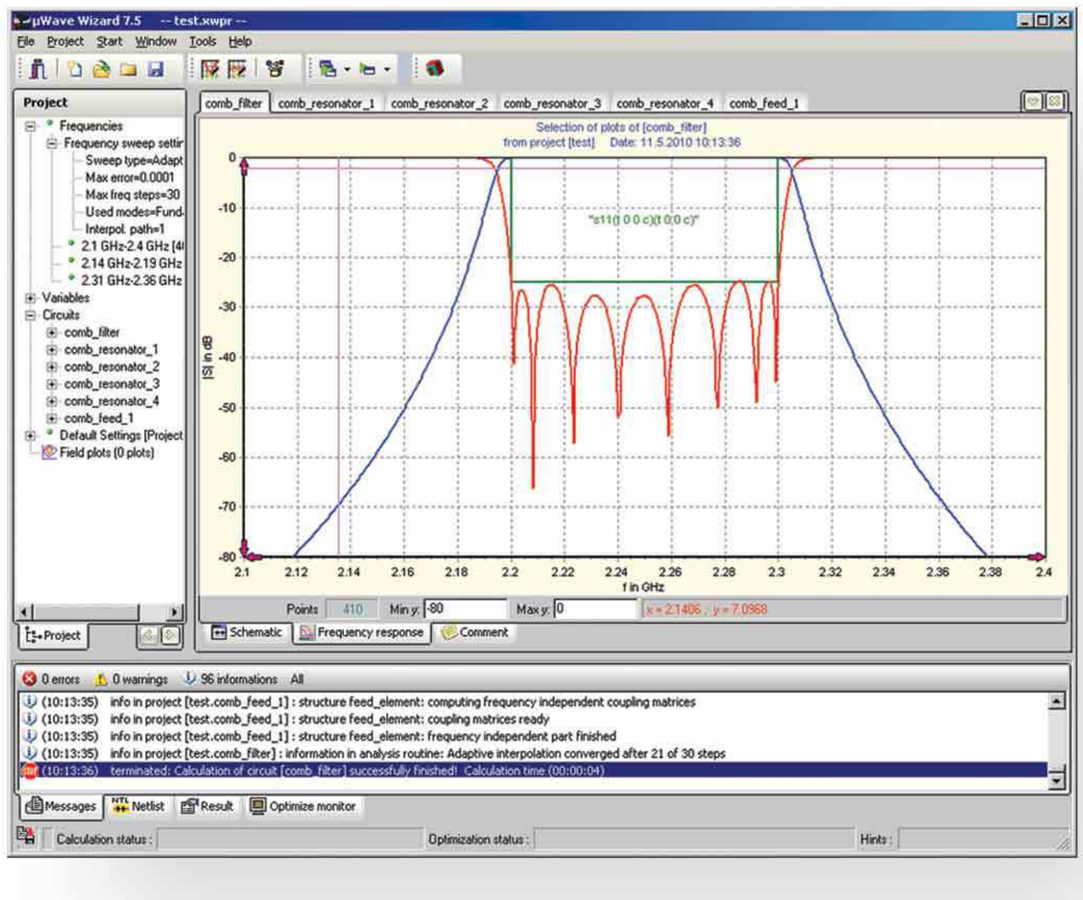
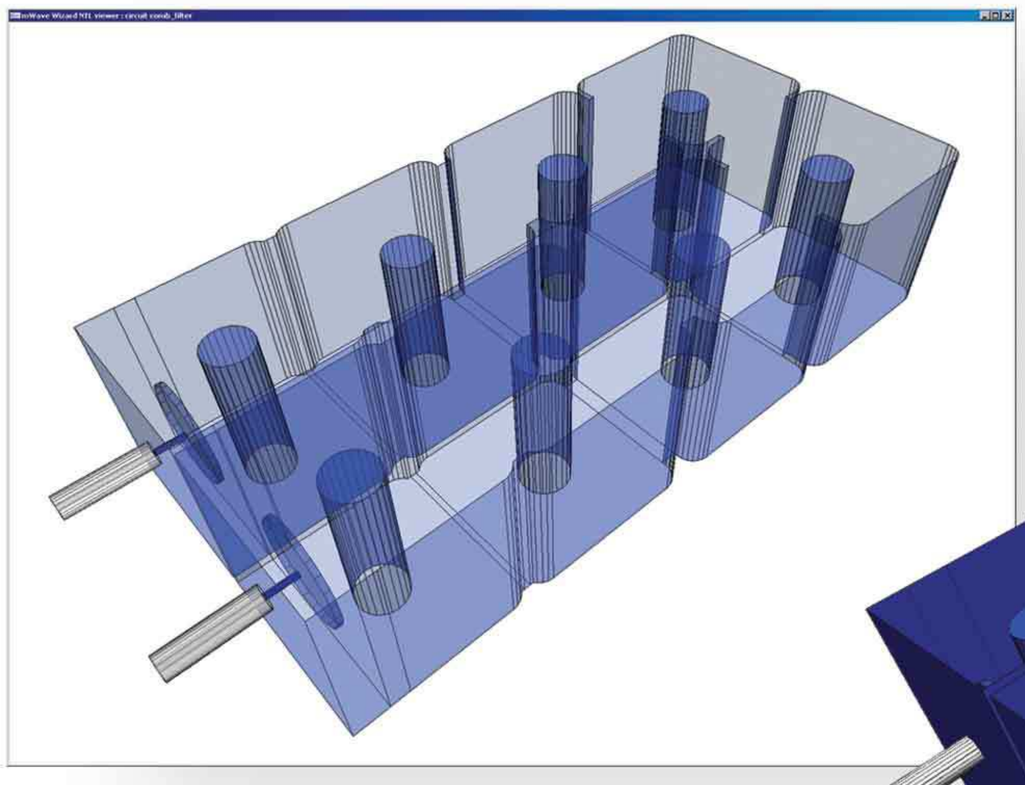


Fig. 2. Main window of the Combline Filter Synthesis Wizard

During the synthesis a plot window will continuously show the improvements and the value of the error. After a successful synthesis and optimization the initial filter parameters will be assigned directly to a µWave Wizard project. All elements, empty waveguides, variables and optimization goals will be set automatically. An analysis by µWave Wizard will show the previously shown optimized curve again. If required a short post optimization may be done by using one of the conventional built-in optimizers of µWave Wizard.







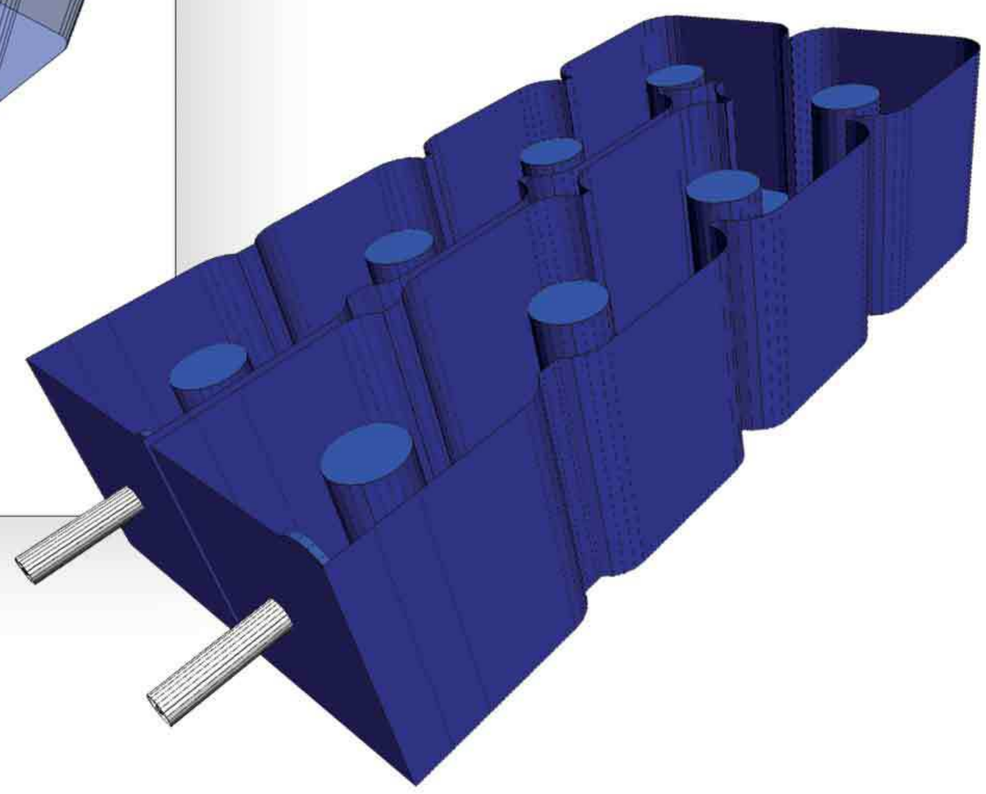


Fig. 3. Synthesis window and post analysis with uWave Wizard of a folded filter

Generalized Chebyshev Bandpass Filter Synthesis Wizard

The Bandpass Filter Synthesis Wizard allows for a fast synthesis of the coupling matrix for bandpass filters with a generalized Chebyshev response and required specifications (filter order, return loss level, defined pure-imaginary transmission or complex transmission zeros and filter topology). The resulting coupling matrix is an excellent source for a filter design. The Bandpass Filter Synthesis Wizard uses a unique technique for the coupling matrix synthesis. This technique is capable of finding the couplings for various non-standard, unique topologies including several load (source)-resonator and direct load-source couplings.

· Support of arbitrary, user defined topologies,
· Support of direct source-load coupling and several source(load)-resonator couplings,
· Support of pure-imaginary and pairs of complex (equalization) zeros,
· Robust algorithm of coupling matrix synthesis,
· User-defined signs of the couplings,
· Low-pass and band-pass input of filter specification,
· On-the-fly preview of the filter prototype polynomials,
· Group-delay preview,
· Built-in optimization module of equalization (complex) zeros placement to flatten group delay,
· Automated transform between low-pass and band-pass prototypes,
· User-defined masks on filter response,
· Easy tuning of the imaginary zeros with slider,
· Preview of the response with finite Q-factor resonators,
· Export of the coupling matrix to text file.

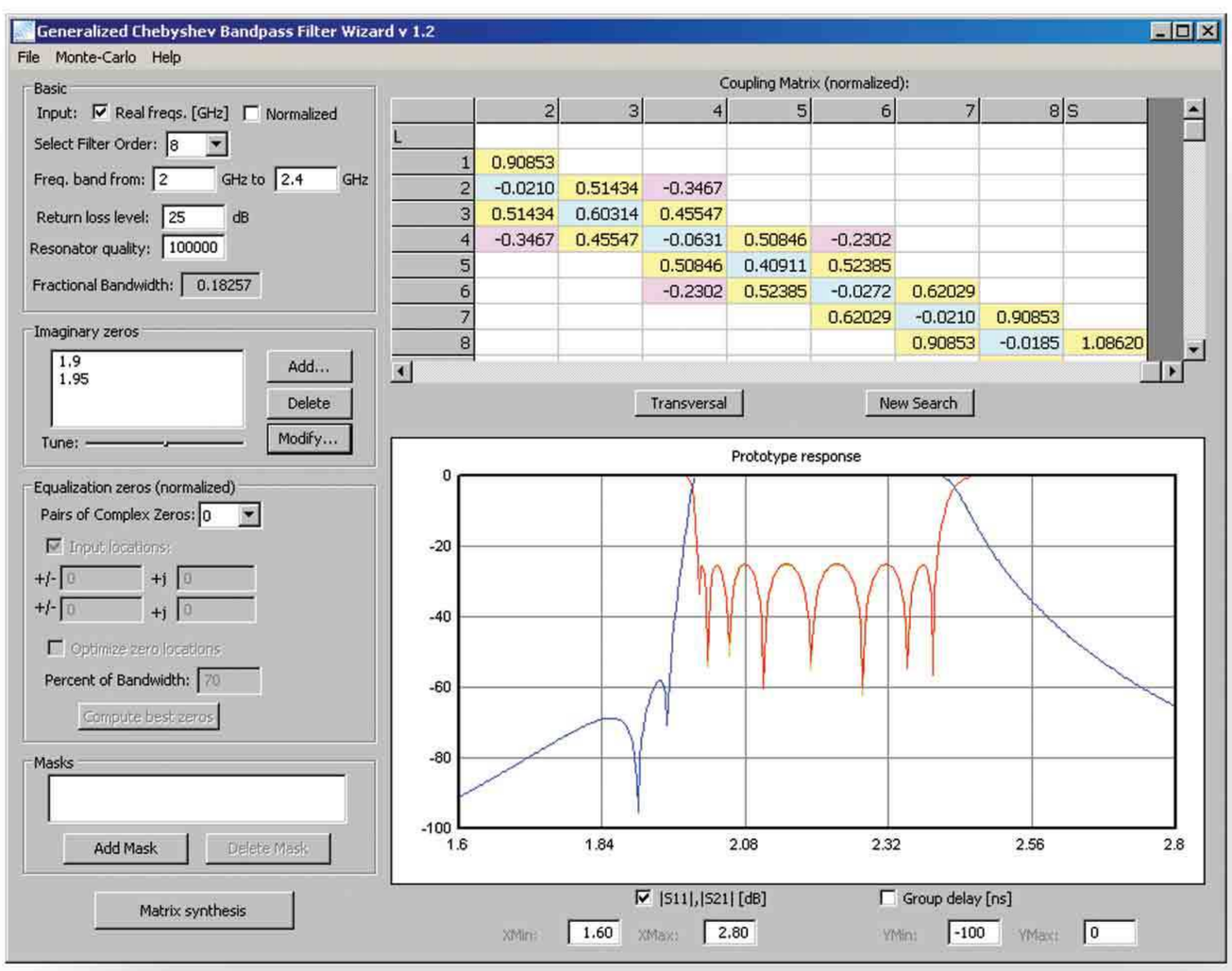
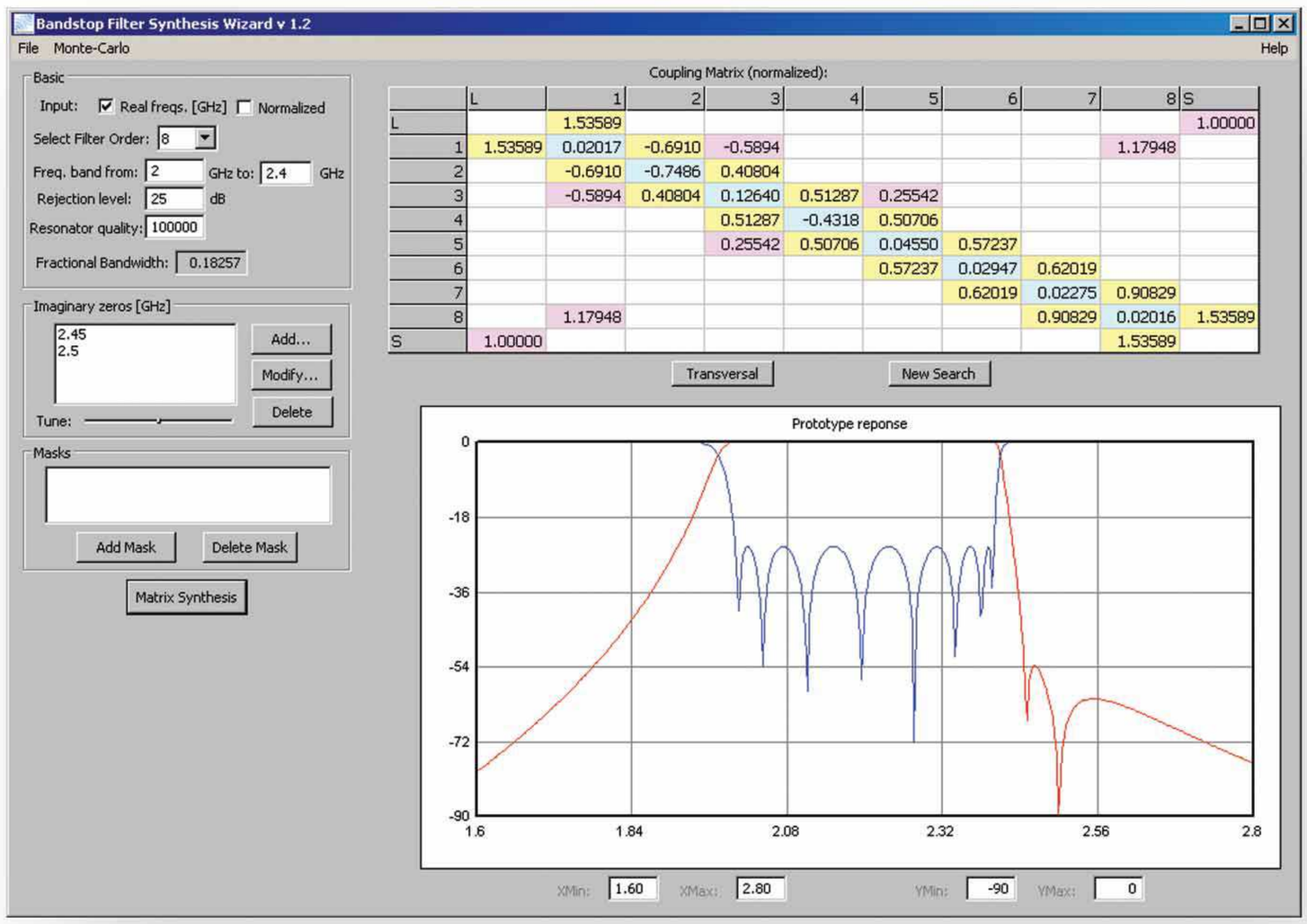


Fig. 4. Example for a coupling matrix of an 8-th order filter. The return loss level is -25dB with two imaginary zeros at 1.9 and 1.95 GHz.

Generalized Chebyshev Bandstop Filter Synthesis Wizard

The Bandstop Filter Synthesis Wizard enables a fast synthesis of the coupling matrix for bandstop filters with a generalized Chebyshev response and required specifications (filter order, return loss level, defined pure-imaginary transmission or complex transmission zeros and filter topology). The resulting coupling matrix provides an excellent starting point for a filter design. Due to a unique technique for coupling matrix synthesis, the Bandstop Filter Synthesis Wizard is capable of finding the couplings for various non-standard, unique topologies including several load(source)-resonator and direct load-source couplings.

· Support of arbitrary, user defined topologies,
· Robust algorithm of coupling matrix synthesis,
· User-defined signs of the couplings,
· Low-pass and band-pass input of filter specification,
· On-the-fly preview of the filter prototype polynomials,
· Automated transform between low-pass and band-pass prototypes,
· User-defined masks on filter response,
· Easy tuning of the imaginary zeros with slider,
· Preview of the response with finite Q-factor resonators,
· Export of the coupling matrix to text file.



	L	1	2	3	4	5	6	7	8	S
L		1.53589								1.00000
1	1.53589	0.02017	-0.6910	-0.5894					1.17948	
2		-0.6910	-0.7486	0.40804						
3		-0.5894	0.40804	0.12640	0.51287	0.25542				
4				0.51287	-0.4318	0.50706				
5				0.25542	0.50706	0.04550	0.57237			
6						0.57237	0.02947	0.62019		
7							0.62019	0.02275	0.90829	
8		1.17948						0.90829	0.02016	1.53589
S	1.00000								1.53589	

Fig. 5. Example for a coupling matrix of an 8-th order filter. The return loss level is -25dB with two imaginary zeros at 2.45 and 2.5 GHz.

About WiComm:

WiComm is the Center of Excellence for Wireless Communications Engineering. WiComm was established at the Faculty of Electronics, Telecommunications and Informatics at the Gdansk University of Technology in autumn 2004 as the result of a nationwide competition which awarded a status of Center of Excellence to one hundred best research groups.
The center is headed by Prof. Michal Mrozowski, Professor of Electronics at the Department of Electronics, Telecommunications and Informatics of the Gdansk University of Technology, Poland. In addition to WiComm he also leads the Applied Computational Electromagnetics Group. The focus of the research is on computational electromagnetics and photonics and CAD of passive microwave structures - especially on filters. The filter design algorithm based on rational models has won the Best Paper Award at the Mikon Conference in 2002.

About Mician:

The establishment of Mician was born out of the idea of providing microwave engineers with fast and accurate design tools that significantly speed up the development process by reducing cycle time. The goal was to avoid the use of time consuming 3D solvers wherever possible and to focus on applying the mode-matching technique and its derivatives instead, even on structures that at first glance seem to be suited for 3D solvers only. This powerful simulation method, together with an ergonomic GUI providing flexibility and openness finally led to the current stage in the evolution of the software tool µWave Wizard™.
Today, engineers and designers in leading microwave companies throughout the world rely on µWave Wizard™ in an effort to reduce design cycles and to speed up the development process.
Furthermore Mician has entered into a partnership with the Center of Excellence for Wireless Communications Engineering and has the exclusive rights worldwide for the marketing of WiComm's filter synthesis tools. More information is available on the web at www.mician.com.

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