

## Hermes: High Speed PCB Signal Integrity Analysis

Impedance discontinuity in the signal path has a significant impact on signal integrity for high speed channel design. Among the many discontinuities, via discontinuity plays an important role in the high speed channel design. Three-dimensional full-wave EM simulation is constantly used to analyze via discontinuity, but there are many defects in the traditional 3D full-wave simulation, for example, the model creation is complex and time-consuming. Hermes provides a fast and accurate way to simulate PCB board and package structure of signal integrity problems, such as insertion loss, return loss, crosstalk, etc., also allows the designer to simulate and track processing for post-layout. Hybrid algorithm have a very fast speed in the premise of ensuring the accuracy of the results, which greatly improve the efficiency of the simulation. The powerful parametric sweeping function can be made by changing the properties of the pad, the stackup, the trace layer and the depth of the back hole, and the results can be easily compared with others. By using the unique electromagnetic field simulation engine, the S parameters can be extracted efficiently and accurately, and update the physical parameters such as the length, width, distance, and stackup to optimize the design. Hermes also provides the feature of exporting to HFSS, which can be used to quickly create models

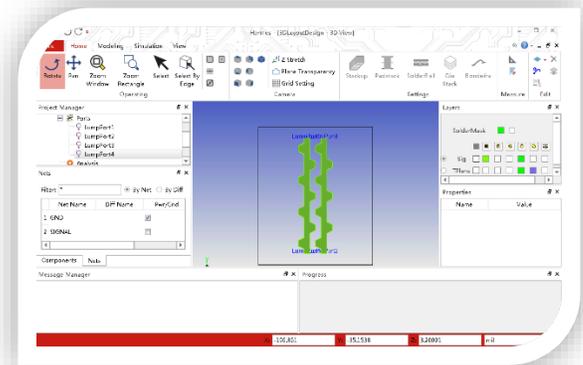
## Hermes Solution

The impedance discontinuities in the signal path has an important effect on signal integrity for high-speed channel design. Hermes is an application which is used to deal with high-speed serial circuit with 3D full-wave electromagnetic simulation. It provides a fast and accurate method to import BRD model, Signal integrity check, such as insertion loss, return loss, crosstalk, also allows the designer do the simulation and tracking processing for the post layout. Hermes Support the main features as following::

- Support import \*.brd, \*.mcm and \*.sip model, and allow arbitrary cutting.
- Support cutting mode of Rect, Polygon and Auto.
- Support import and parse ODB++ file.
- FEM3D solver provides a high precision, high quality solution.
- Make the model check easier and more intuitive with 3D view function.

- Support export to HFSS.
- Support edit trace and add Lump Port info.
- Use the SnpExpert tool to display the S parameters and TDR curves

## FEATURES

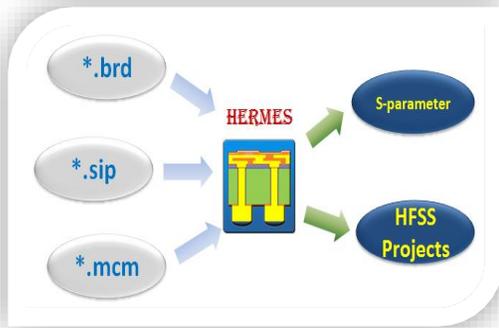


Hermes interface

## Multiple Ways to Create Models

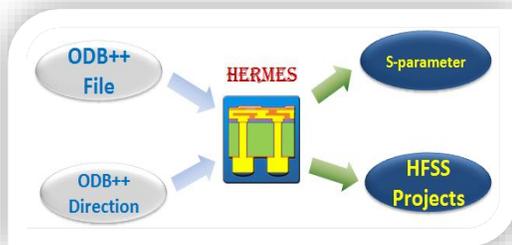
Hermes provides quick ways to create models:

- Support import brd, mcm, sip file from Cadence.



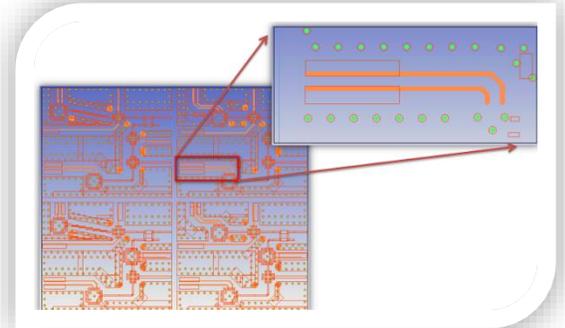
Import Cadence file

- Support import ODB++ file



Import ODB++ file

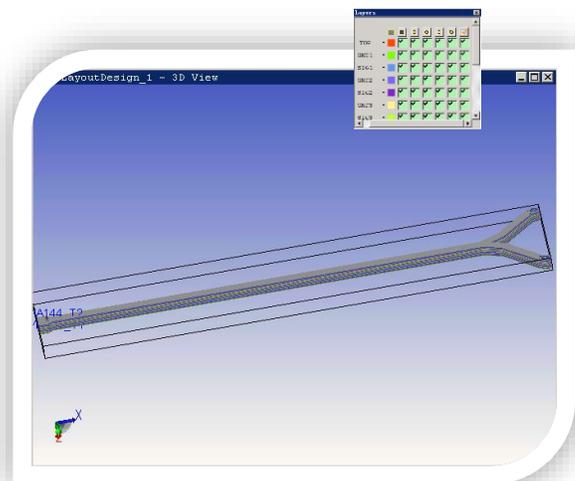
- Effective cutting for the imported files, so that choose simulation area purposely to avoid simulation area tool big.



Cutting

### 3D Model

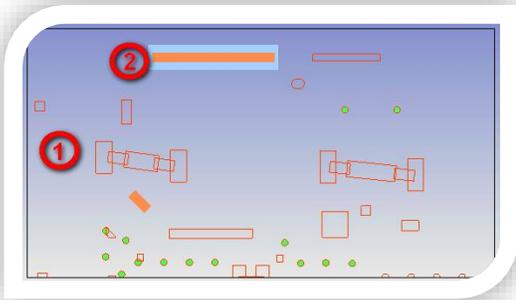
3D view provides a more intuitive view of the model, the user can setup show/hide different modules, ports, plates, stacks, etc.



3D model view

## Import Multiple Models

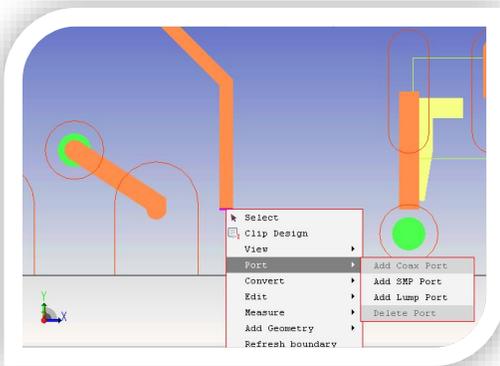
In ODB++ flow, now support multiple models, user can set the second model's height, location and rotate it.



Multiple Models

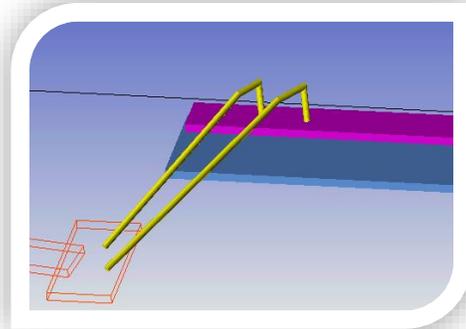
## Add port and Bondwire

Support manually add Coax port for the Signal pin, add the Lump port or SMP port on the trace, select the port layer and set the port of some parameters, such as the port's inner and outer radius, height and characteristic impedance.



Add Port

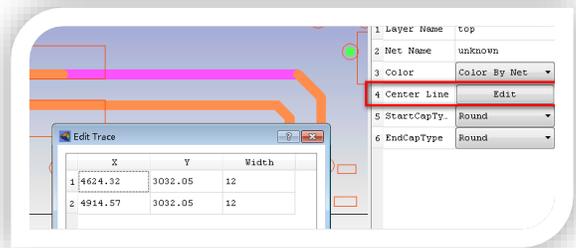
Add bondwire to connect pads or two models.



Add Bondwire

## Edit Trace

Change the length and direction of trace by editing its center line.



Edit Trace

## FEM3D Solver

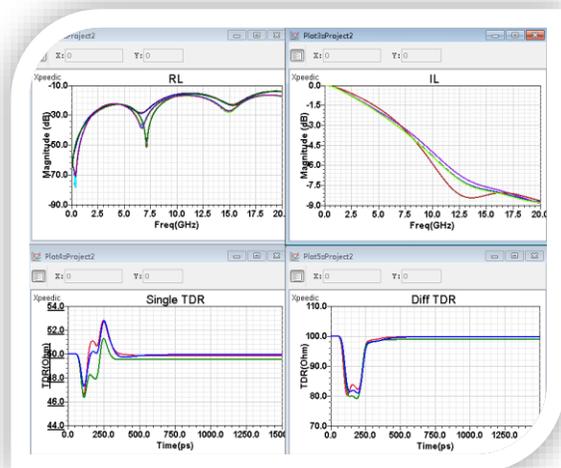
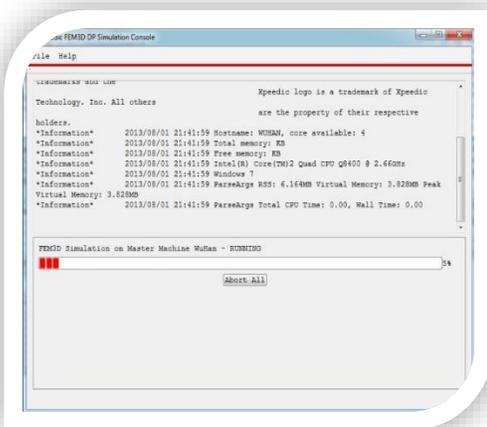
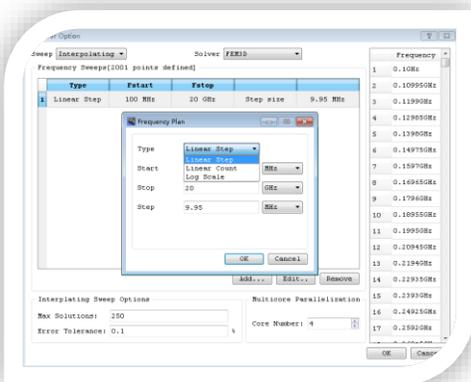
Considering the requirements of precision and performance, Hermes provides three kinds of solvers: FEM3D solver has more reliable accuracy and more high quality results, Hybrid solver in ensuring the premise of certain precision with faster speed, greatly

improving the solving efficiency, Cascading solver has high simulation efficiency, using Tline2DSolver solver to obtain the S parameters of transmission line, which simplifies transmission line simulation model; above three kinds of solvers are a combination of parallel technology to improve running efficiency, at the same time, the distributed and multi core processing, compared to similar products on market have more competitive advantage.

## Result Post-Process

S parameters generated by Hermes can be displayed through the SnpExpert. Users can view more features of the parameters and results:

- Single ended and paired port conversion
- Display S parameters, TDR and eye diagram
- Include FEXT, NEXT, PSXT, ILD, ICN, ICR and other graphics display
- Include comparison of standard parameters, such as 802.3ba OIF, CEI-25G/28G IEEE, etc.
- The calculation and display for passivity, causality, reciprocity, stability metrics, and enforcements.



S-parameter Display

FEM3D Solver Console

Export to HFSS

Hermes provides rapid method to export model to HFSS as baseline analysis. The exported script have all settings, include stackup setting, port and trace etc.

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