IBIS Interconnect Task Group

IBIS Interconnect Task Group Update: Touchstone 3.0 Features & Progress

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Who Is The IBIS Interconnect Task Group?

- Designs and writes technical changes to support passive interconnect modeling formats
 - Supports IBIS, Touchstone and IBIS-ISS
 - Live teleconferences are held Wednesdays 8-9 AM US Pacific Time
 - Web site: https://ibis.org/interconnect_wip/
 - Freelists is the most up-to-date source for documents and discussion:
 - <u>https://freelists.org/archive/ibis-interconn/</u>



Interconnect Task Group Current Work

- Touchstone 3.0 is being prepared
- Touchstone Issue Resolution Documents
 - 7.2 <u>Standardized Pole-Residue Representation</u>
 - 8 <u>Option line changes</u>
 - (9) Port-mapping (WIP): Draft 13



The goal: balance usability by the wider industry (e.g., for RF purposes) with IBIS-specific features to help with package and system interconnect modeling

What Pole-Residue Looks Like

Not shown... [Begin Pole-Residue Data Source] / [End Pole-Residue Data Source]

- A coefficients example, where data corresponds to $[\alpha_m \ \omega_m \ A_m \ B_m]$ complex pole and normalized residue pairs, respectively

```
[Number of Pole-Residue Indices] 10
[Begin Pole-Residue Data] (1,1) (2,2) (3,3) (4,4)
Delay = 1.26351e-09
Constant_at_infinity = 0.321123423421
Number_of_data_lines = 35
1.60981891e+08 6.038300e+09 -2.15363238e-06 1.96534688e-05
2.93321810e+09 1.917708e+09 -1.05426912e+01 -8.82630433e+00
1.23990373e+08 4.399943e+09 1.257286128e-05 2.13669372e-05
...
5.23409852e+06 1.345345e+07 3.073147044e-06 5.16091015e-06
[End Pole-Residue Data]
```

| Additional data pairs follow ...

The data is meant for use in a single equation shown here for one (row, column) element...

Alternately, a pair of keywords may be used:

Common Poles Data

- All matrix elements share the same poles
- Just one per set model file

Residues Data

- Defines data for individual pairs
- Also includes the same subparameters

$$H(if) = e^{-i2\pi fD} \left\{ H_0 + \frac{1}{2} \sum_{m=1}^{M} \left[\frac{A_m - iB_m}{1 + if / (\alpha_m + i\omega_m)} + \frac{A_m + iB_m}{1 + if / (\alpha_m - i\omega_m)} \right] \right\} + ifG$$

This format is understood and used, with variations, by several existing industry tools. The change to Touchstone has already been approved.

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What Port-Mapping Looks Like (Today)

Parameters not shown include... Units User-defined measurement locations



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Our Request to the Community

- The 2023 European IBIS Summit audience spoke clearly
 - Reduce file sizes & support port-mapping for automation in Touchstone



- If these two features were the major changes to Touchstone 3.0...
 - ... would you switch from Touchstone 1.x to Touchstone 3.0 as default?

What test cases would you need to evaluate Touchstone 3.0?

Please review the drafts on the IBIS Interconnect web site and provide comments!

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