Piezo1D 1.0

1-D Electromechanical Device Modeling

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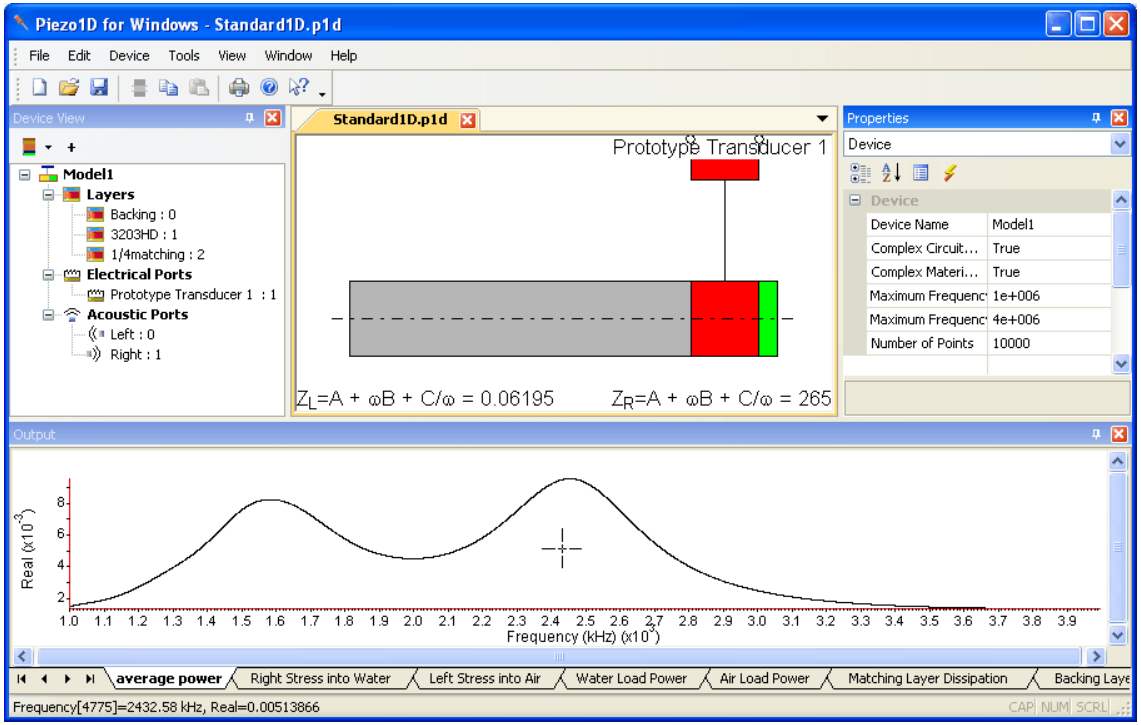
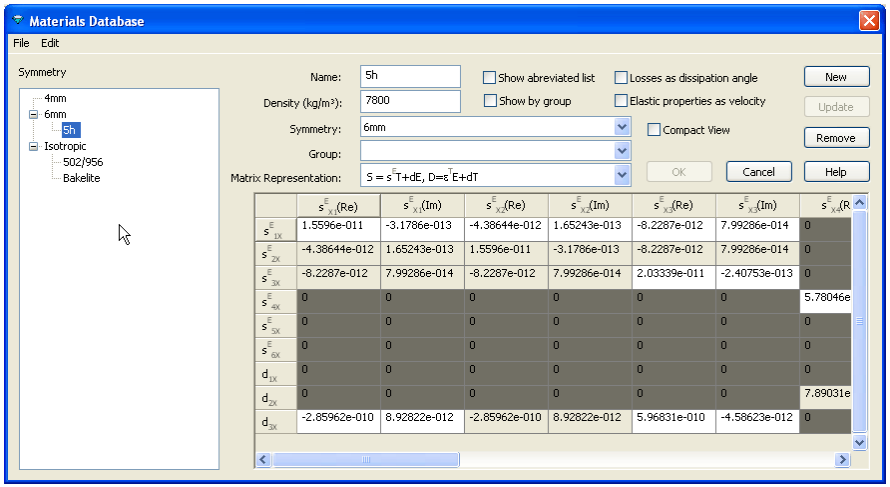
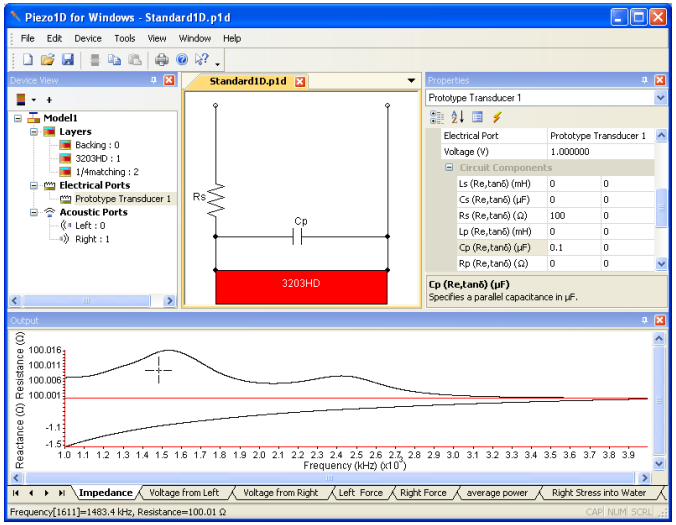
- Comprehensive 1-dimensional modeling of multi-layer devices allowing any number of layers
- Analysis is extension of KLM equivalent circuit model and Mason's model
- Results of analysis updated in real time as model is changed
- Layers of model are elastic or piezoelectric
- Material properties can be real or complex to include losses
- Runs under all Microsoft Windows operating systems



Model Structure

- Layers added and removed with the click of the mouse
- Electrical port can include arbitrary electronic network
- Left and Right acoustic ports can include arbitrary acoustic load impedance (Z_L and Z_R)
- Parallel layers possible if force or velocity of parallel layer faces are in phase
- Layer properties can be populated by a Database of Materias, possibly including results determined by PRAP
- Piezoelectric layers as TE or LE element
- Option to enter elastic properties as velocity
- Option to enter losses as tanδ





Analysis

There is a set of results calculated from the KLM or Mason's Model that fully characterize the device. These results can be included in any number of user-defined equations to characterize the device. In addition to the electrical port circuit components, frequency, layer area and layer thickness, the following basic properties are calculated;

- Left and right face velocity due to each electric and acoustic port for each layer
- Left and right face force due to each electric and acoustic port for each layer
- Dissipation in each layer due to each electric and acoustic port
- Impedance of each electric and acoustic port
- Electric port voltage due to each acoustic port
- Left and Right acoustic load impedance

These properties can be used as variables in user-defined equations where a full range of binary and unary operators are available.

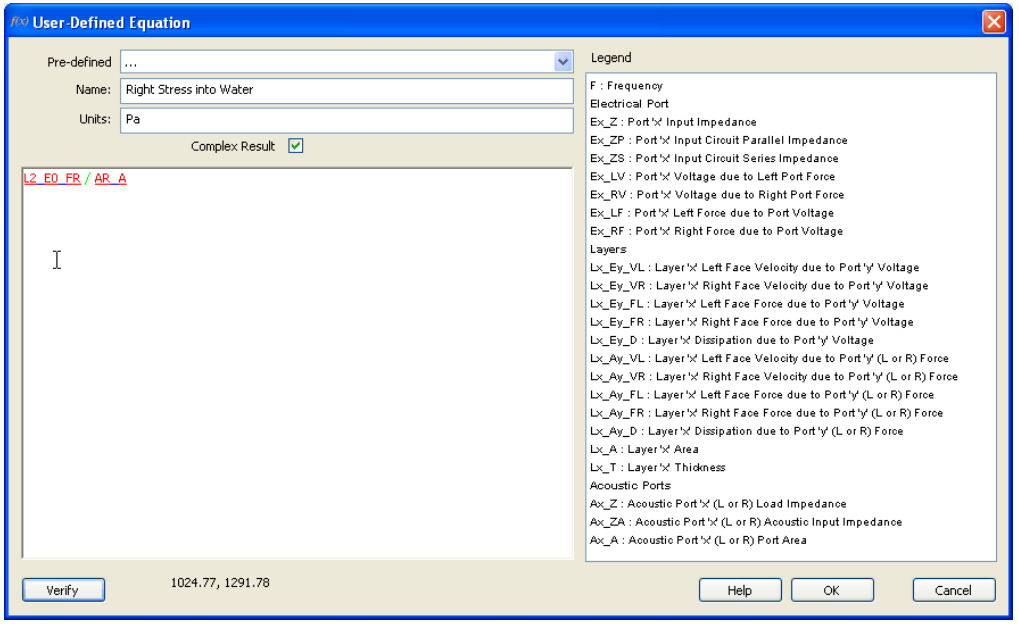
A set of predefined equations are available for commonly required device characterization including;

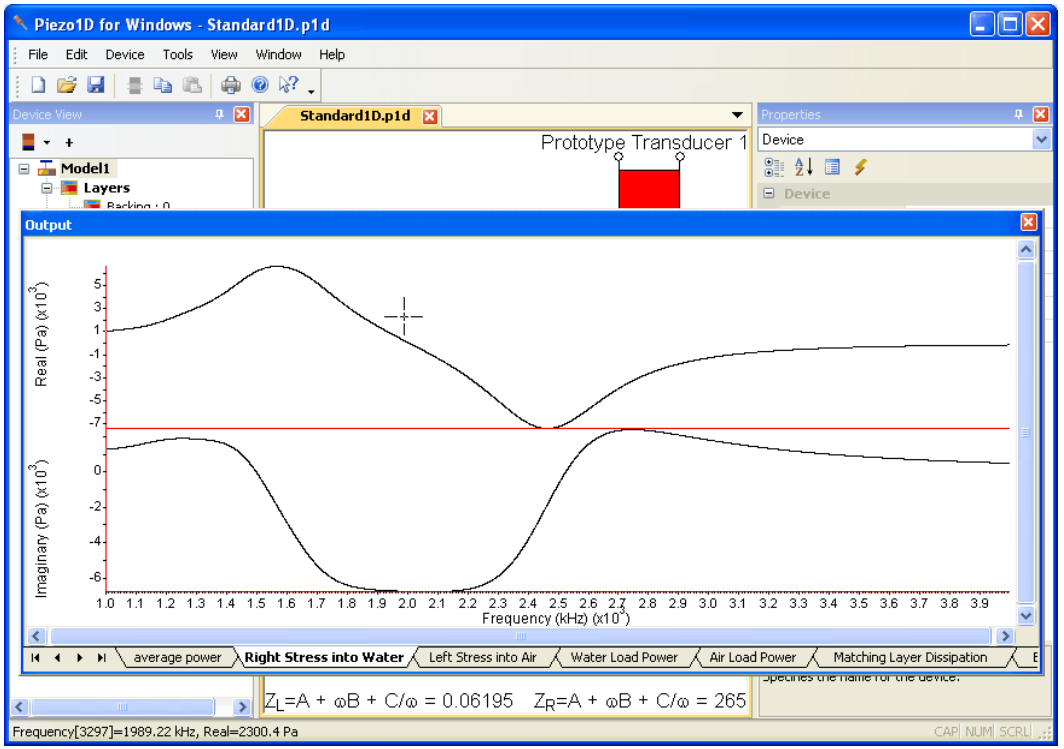
- One and two-way Insertion loss to left and right
- Power factor

Output results can be printed or copied to the Windows Clipboard

Enhancements to Come

- Inclusion of frequency dispersion in properties
- Inclusion of first-order non-linearity in material properties through the Rayleigh Model whereby properties are dependent on field or stress
- Addition of other piezoelectric modes such as radial, cylindrical, shear and spherical modes





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