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MEDEA
Multipurpose Display Engineering Analysis
Why are DOE codes so hard to run?

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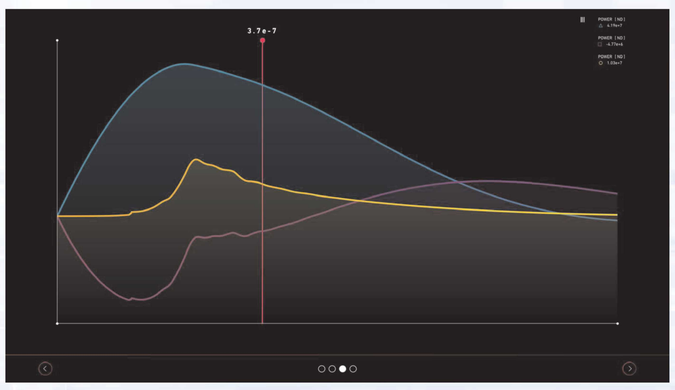
Input deck driven codes typically require 100's of lines of input in order to mesh the domain, specify materials, establish boundary and initial conditions and then execute. Post-processing of results are left to the user's discretion in terms of software choice, layout, look and feel, and quality of presentation.

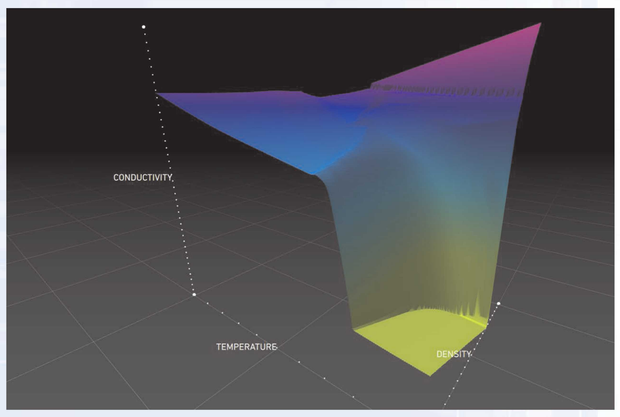
For a new or infrequent user, this process itself is an obstacle to obtaining rapid results for simulations which might need to be explored multiple times before a satisfactory result is obtained.

Can't we improve the process?

MEDEA was designed with the intent of improving simulation workflow by allowing users easier access to VIEW content of interest, SIMULATE using a templated input deck, and the ability to ANALYZE properties of interest with ease.

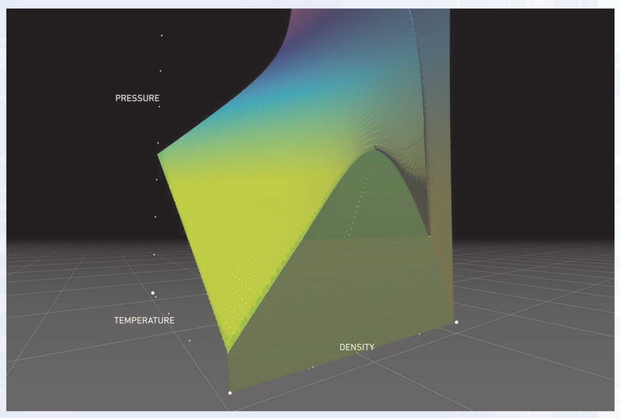


Example global variable output multiplot from MEDEA.

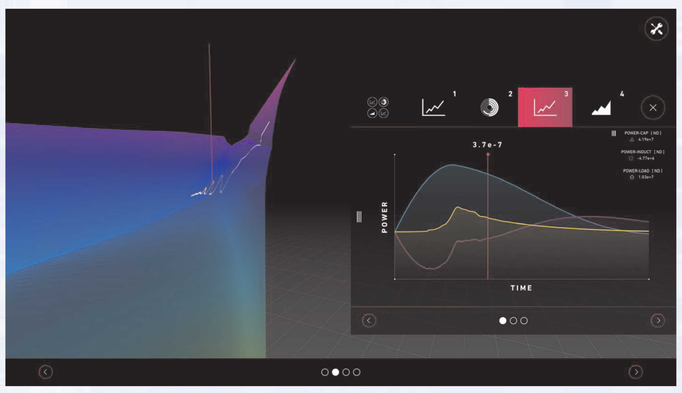


MEDEA currently supports views from SESAME tabular files (electrical conductivity example).

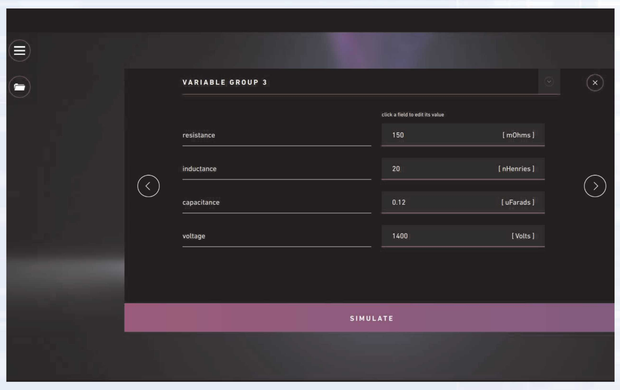
A more sophisticated 4-up plot including lines, shading, and a performance meter.



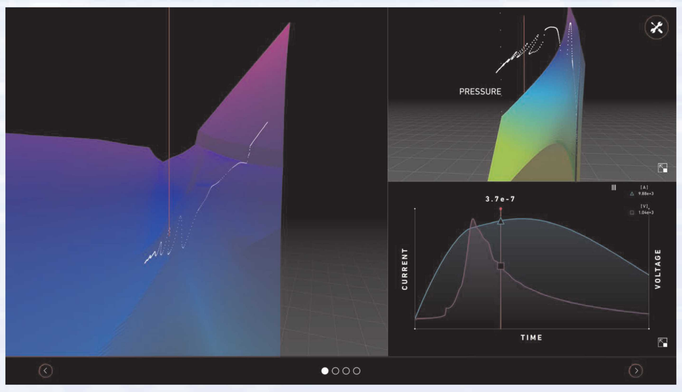
MEDEA also supports views from Utri formatted tables for multiphysics simulations.



A highly sophisticated plot including material property view with material trajectory (left) and a configurable legend (right) with time correlated between the two views.



Rather than directly accessing the input deck, the user interfaces with a GUI which displays variable name entries and values which can be updated. Once completed the user then pushes the SIMULATE button to run the simulation.



MEDEAs most sophisticated plot contains simultaneous views of two material properties correlated with global output. All views are correlated in time and defined within the XML file.

```
<inputDeck>
     <runCommand>runAlegra ebw2D</runCommand>
     <dependencies>
          <file name="ebw2D.*"/>
          <file name="single_det*"/>
     </dependencies>
     <inputs>
          <variableGroup number="1">
            <variable type="float" unsigned="true" units="seconds" default="0.5e-
6">tend</variable>
          </variableGroup>
        <variableGroup number="3" presets="Firingset-list.csv">
          <variable type="float" keywords="nonzero,positive" units="mOhms" default="150">resistance</variable>
          <variable type="float" keywords="nonzero,positive" units="nHenries" default="250">inductance</variable>
          <variable type="float" keywords="nonzero,positive" units="uFarads" default="0.5">capacitance</variable>
          <variable type="float" keywords="nonzero,positive" units="Volts" default="1400">voltage</variable>
          </variableGroup>
     </inputs>
     <outputs file="ebw2D.ahis" headerlines="2">
          <view id="3">
               <mainplot type="lineplot">
                    <x var="time" label="Time"></x>
                    <y var="power-cap" label="Power"></y>
                    <y var="power-induct" label="Power"></y>
                    <y var="power-load" label="Power"></y>
               </mainplot>
          </view>

     </outputs>
</inputDeck>
```

Under the hood is an XML file which a super-user has constructed to define the names of the input parameters as well as specification for plot output. MEDEA can run many types of input deck driven codes.

MEDEA was designed to assist user workflow by accessing an already existing templated input deck and an XML file of instructions written by a super-user. Currently MEDEA works on Windows O/S and will operate on the Mac O/S within the next 6 months.

For more information or access to MEDEA please contact:
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MEDEA was created in collaboration with programmers and graphics artists from Ideum.

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National Nuclear Security Administration

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