LS-OPT® Version 5: A Flowchart-based Interface for Process Simulation and Optimization

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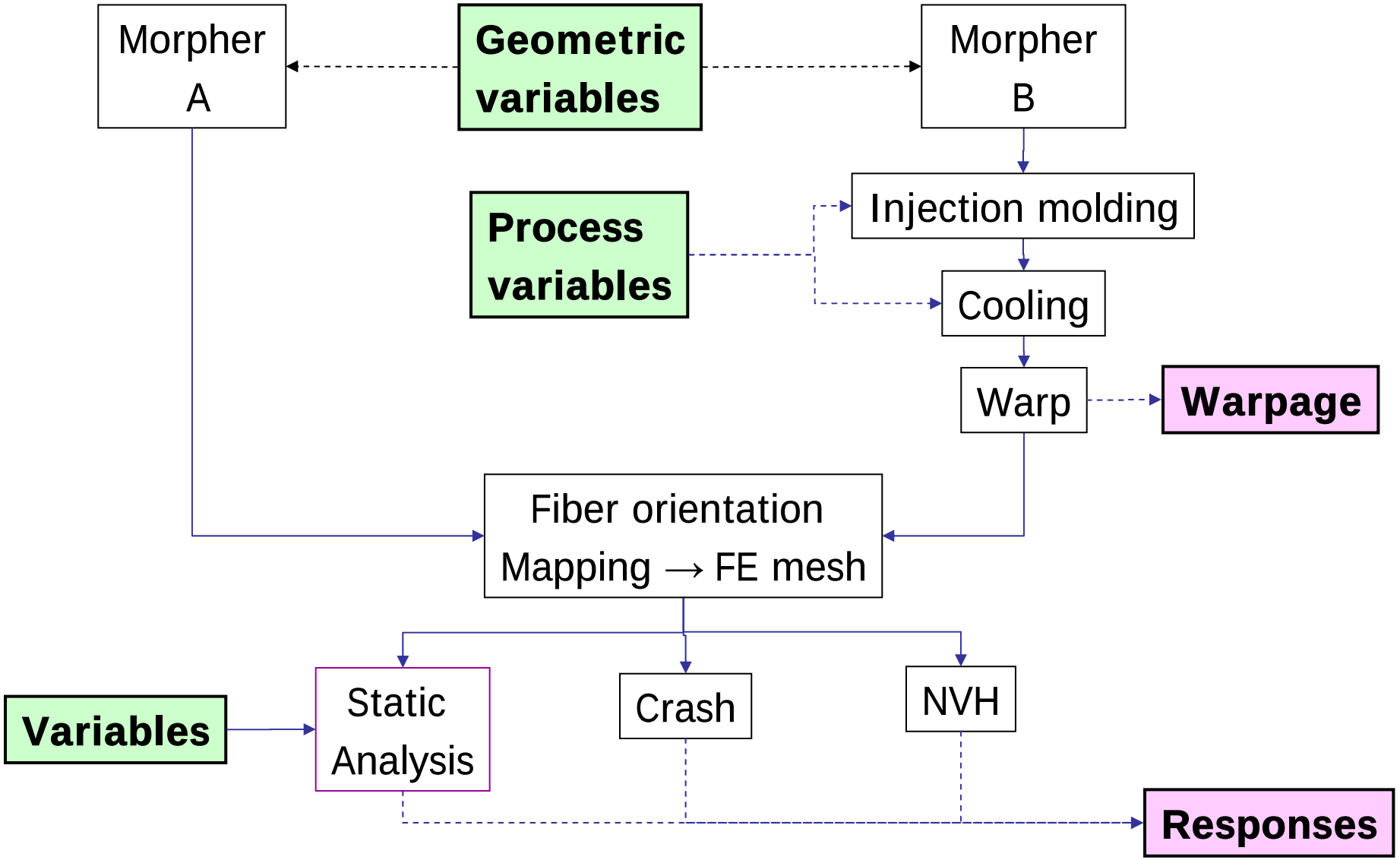
Oct 10, 2012

Overview

- Introduction: Goals
- Example: Manufacturing process
  - Demonstration
- Other new features
- Closure

Process modeling
Merging and branching

Wüst, A, Hensel, T, Jansen, D.
Integrative Optimization of injection-molded plastic parts –
Multidisciplinary shape optimization including process induced properties.
Proceedings of the 7th European LS-DYNA Conference, Salzburg, Austria, May 14-15, 2009

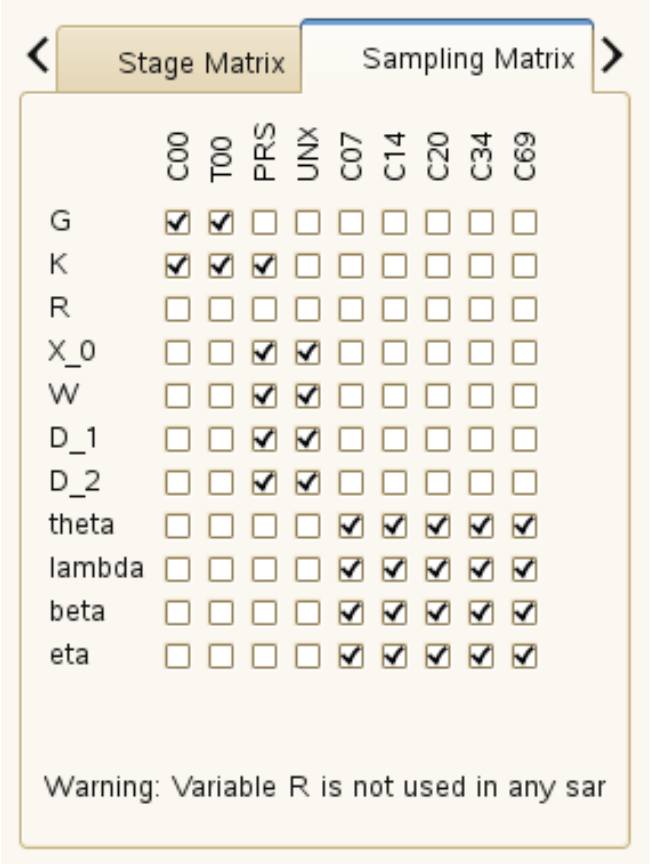


Principal Goals

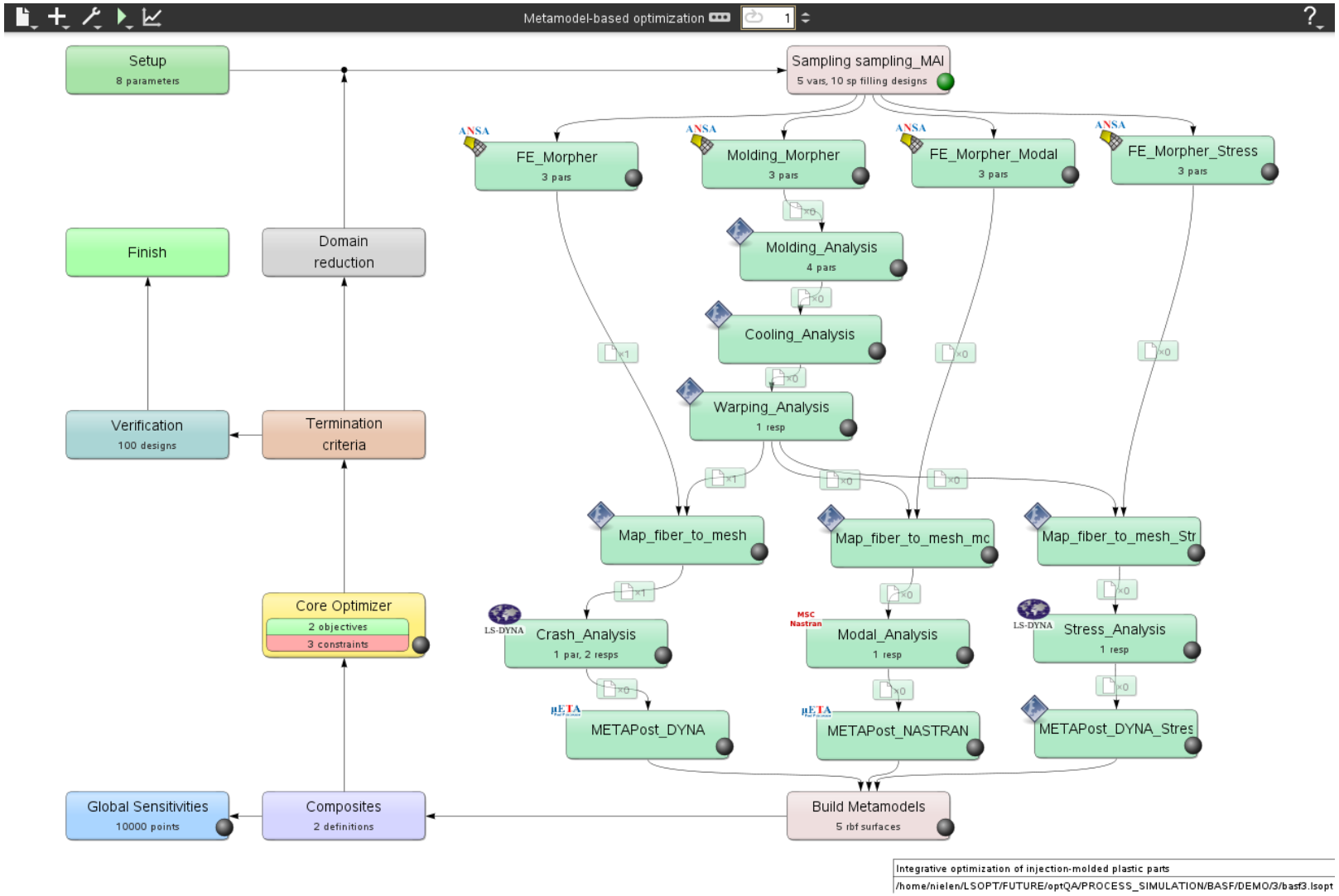
- Provide a capability for simulating and optimizing a multidisciplinary process.
- Handle job flows that merge and branch. Providing a tree structure is not sufficient.
- Streamline job load balancing by allowing independent global resource definitions.
  - Removes limits on multi-case parallel simulations: improves throughput
  - Any number of resource types per stage
    - Applies to license limits, processor limits, memory limits, disk space, ...
- Increase transparency
  - Show progress at all phases: simulation, optimization, ...
  - Modernize solver job progress
  - Track design parameters and their sources
- Simplify data flow:
  - Support for file operations: copy, move, delete.

Goals (contd.)

- Simplify variable reduction and restart
  - Seamless interface for variable screening and optimization
  - Re-select variables and continue next iteration
- Minimize keystrokes
  - “Replace” (save) rescinded
  - Economy of selections
    - Dual function buttons
    - Omission of redundant options improved
- View multiple windows
  - GUI, progress (stage-based) and processing at the same time



Flowchart of an injection molding example



Demonstration

- Large example

  LS-OPT Example

- Set up an example from scratch

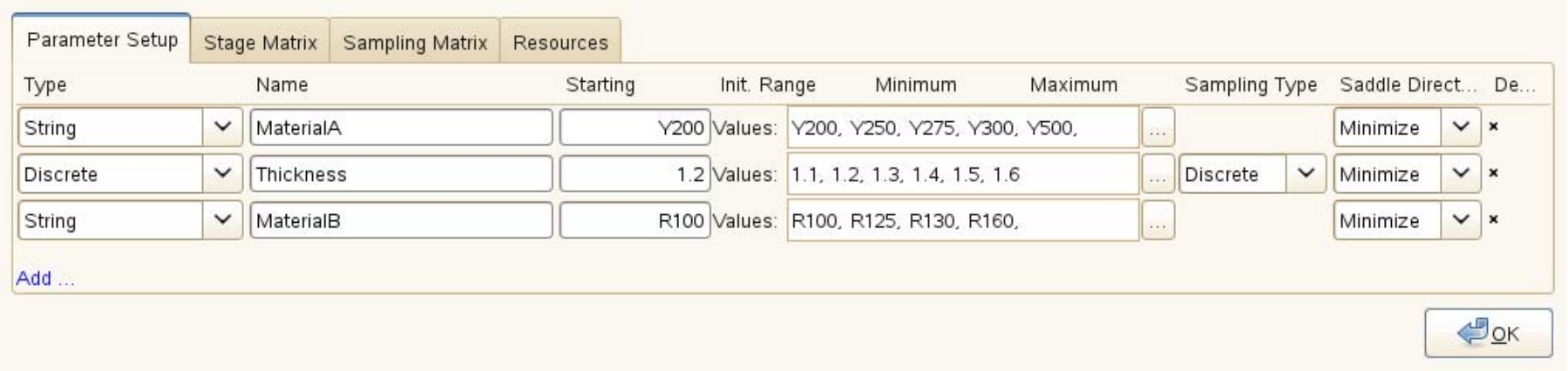
  LS-OPT Setup

- Run a process

  LS-OPT Run

Other new features in LS-OPT v5

- Support for string variables and constants. Both in LS-OPT and LS-DYNA



- Support Vector Regression as a metamodel
  - Precursor to multiple surrogates – to automate metamodel choice

Future Developments

- Enhanced Global Optimization (EGO) (5.1)
  - Established, Kriging-based global optimizer based on the probability of finding an improved solution
  - Facilitates search for multiple local optima
- Parallelization of LS-OPT
  - Metamodel generation
- Enhanced GUI
  - Support Excel formulas as a response type (5.1)
  - Facilitate generation of expressions
  - Support entity selection from FE model