1st Forum on Plant Modelling

SICE, Control Division, Technical Committee on Plant Modelling

Introduction and Demonstration of High Level Modelling Tool (HLMT)

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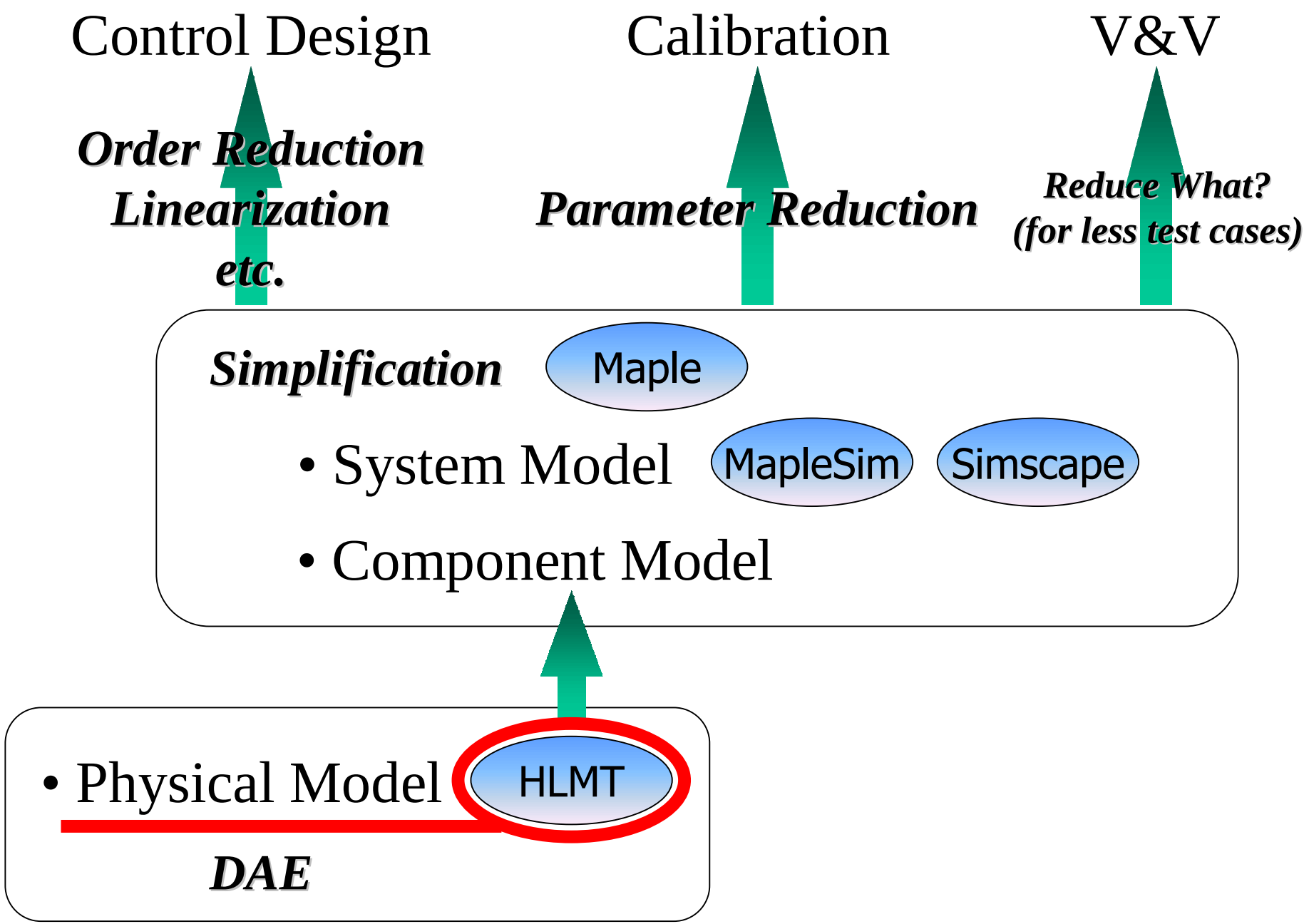

Control Design
Calibration
V&V
Order Reduction
Linearization
etc.
Parameter Reduction
Reduce What?
(for less test cases)
Simplification
Maple
• System Model
MapleSim
Simscape
• Component Model
• Physical Model
HLMT
DAE

Topics Overview

1. Physical Modelling using HLMT
    - 1.1 Building A Physical Model
        - *Modelling Elements* - **Components / Ports & Connections / Conservation Quantities / Flows / Parameters / Intermediate Variables / Port Variables / Tables / User-defined Procedures / Constraints**
        - *Connectivity Management – Domain Neutrality*
        - *Parameter Management*
        - *Unit Management*
    - 1.2 Simulation
        - *Initial Value Management*
2. Symbolic Equation Manipulation on HLMT Models
    - 2.1 Building System Equations … HLMT:-GenerateEquations()
    - 2.2 Deriving Simulatable Equations … HLMT:-SimplifyEquations()
        - *Simplification with Parameter Symbols Preserved* … paramStudy=true
        - *Simplification with Parameter Values Assigned* … paramStudy=false
    - 2.3 Simulation
3. Physical Knowledge-Base Repository (PKBR)
4. Component Library
5. Interface with Other Tools

1. Physical Modelling using HLMT

1. Structure of HLMT Application Window

2. Simplest Possible Example … Live modelling demo
   - *How to Compose A Model*
   - *How HLMT Works – Equation Management and Simulation*
   - *Defining Custom CQ Types*

3. Resistor Capacitor Parallel Circuit … Model #1
   - *Basic Modelling Elements*

4. Piston-Conrod-Crank System … Model #2
   - *Constraint*

5. Compressible Gas Flow across Chambers … Model #3
   - *User-defined Function*

2. Symbolic Equation Manipulation on HLMT Models

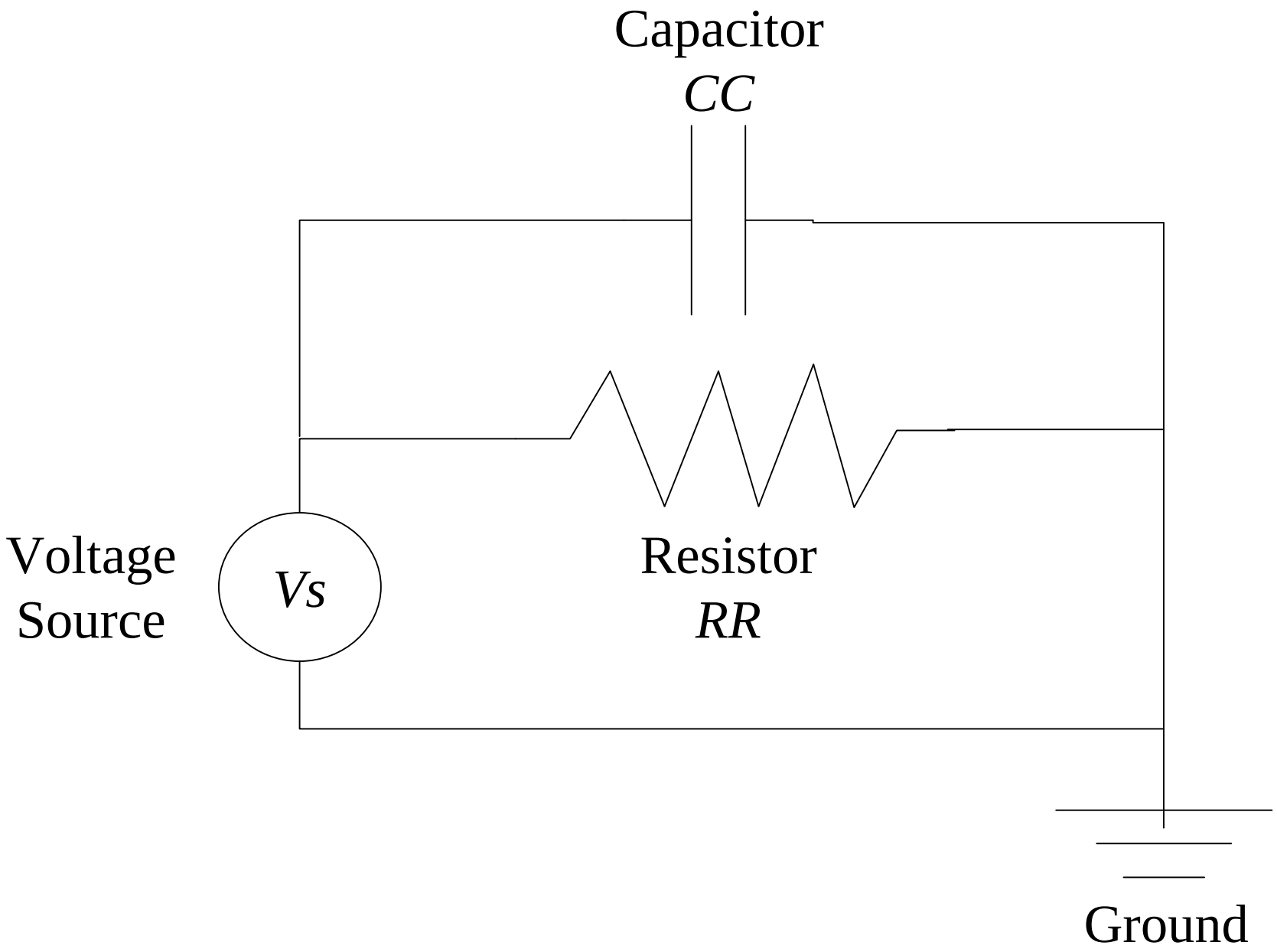
1. Building System Equations … HLMT:-GenerateEquations()

2. Deriving Simulatable Equations … HLMT:-SimplifyEquations()
   Simplification with Parameter Values Assigned
   Simplification with Parameter Symbols Preserved

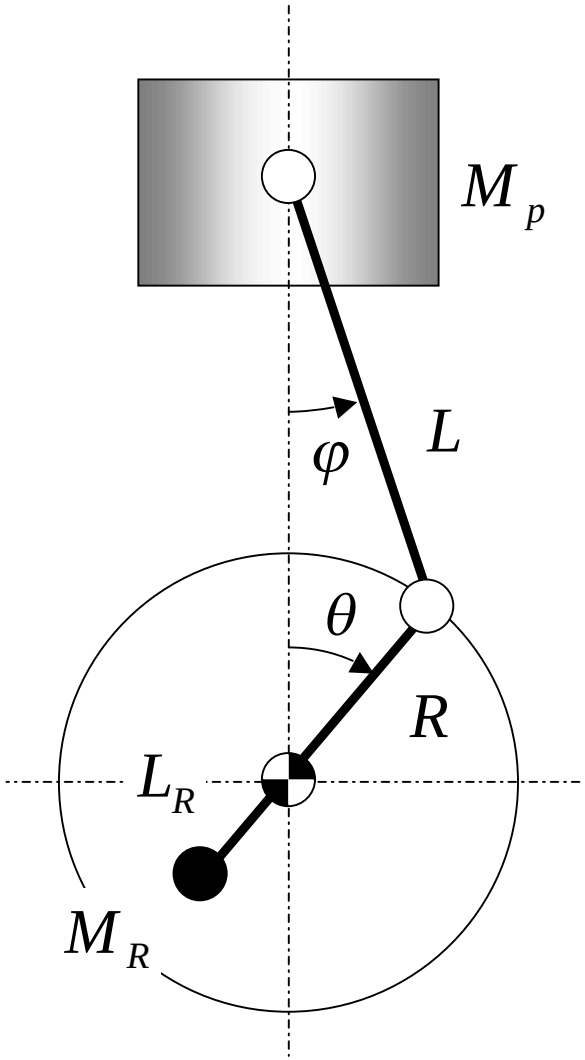
3. Simulation

3. Physical Knowledge-Base Repository (PKBR)
4. Component Library
5. Interface with Other Tools

Resistor Capacitor Parallel Circuit



Piston Connecting-Rod Crank



Gas, Nozzles and Chambers