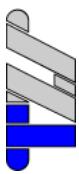




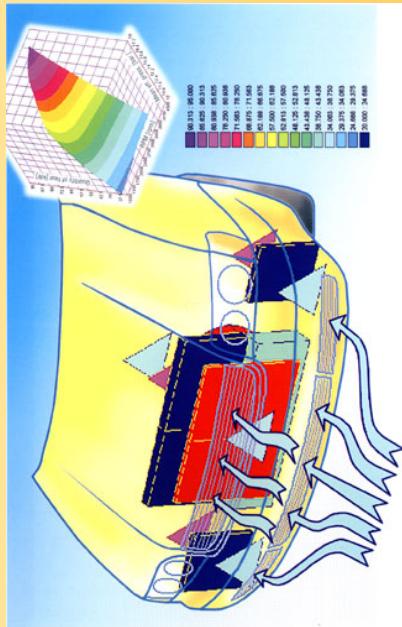
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# KULI

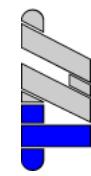
## 2nd User Meeting 1999

# KULI Developments



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KULI Developments



## KULI Basic Module

### KULI ADVANCED

Integration, Interfaces  
**FLOWMASTER**, Heat Exchangers, CFD

### KULI DRIVE

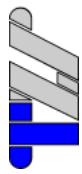
Transient Simulation, Optimization

### KULI AC

Air Conditioning

### KULI HEATSIM

Heating and Ventilation Systems



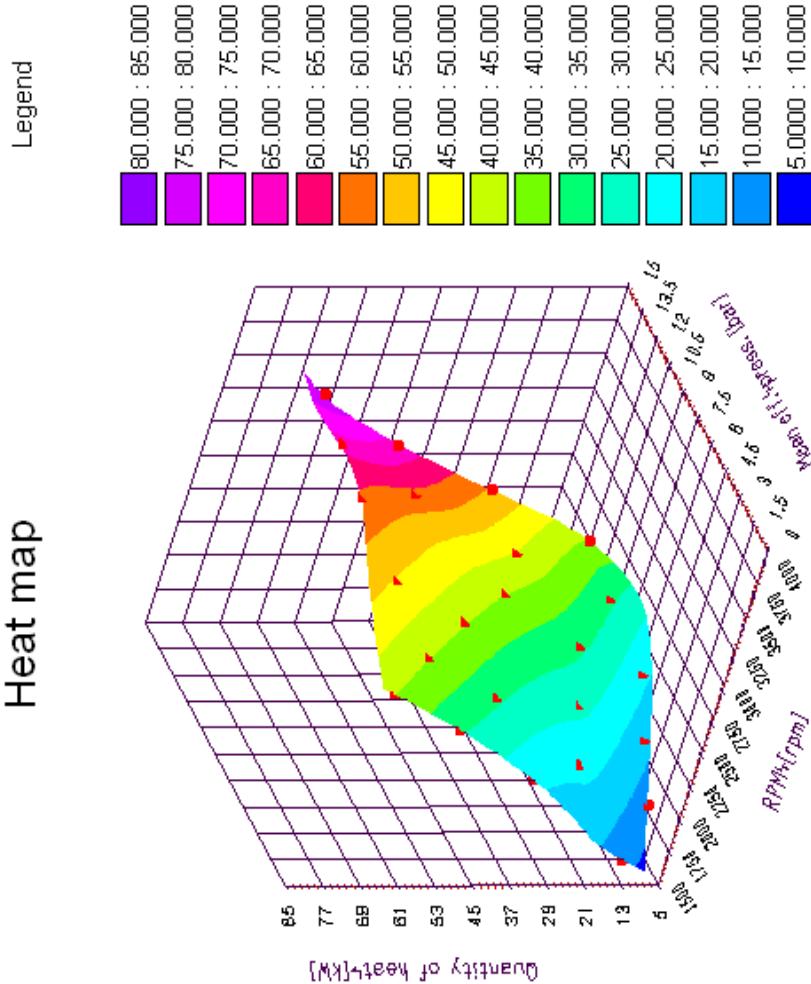
## KULI 3.1 - Highlights

- ◆ 3-D Heat and Flow Maps
- ◆ Regression of Heat Transfer Data
- ◆ Storing and Printing Graphics
- ◆ Licensing (FlexLM, License on Server)
- ◆ Window for FLOWMASTER References
- ◆ Units for Input Data
- ◆ Parabolic Resistances
- ◆ Saving the Configuration in "INI"-Files



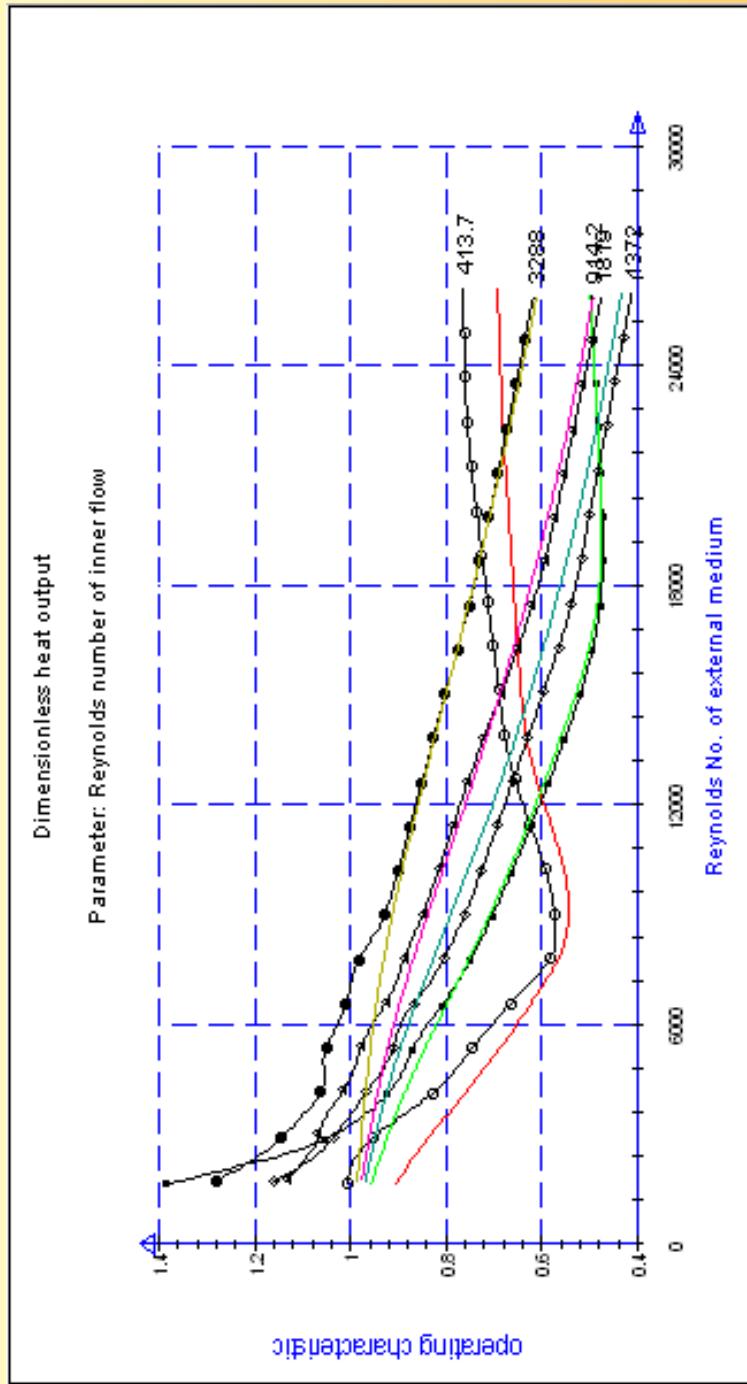
## 3-D Heat Map

Heat map



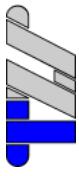


## Regression of Heat Transfer Map



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KULI Developments



# FLOWMASTER References

Actual Project	Training
Actual Network	ChargeAirCooling_2

Flowmaster Projects / Networks

X

- Network: ChargeAirCooling\_SCS Project: Training
  - .... ID 5 = 1.wk
  - .... ID 7 = 2.wk
  - .... ID 3 = 1.PwT
- Network: ChargeAirCooling\_2 Project: Training
  - .... ID 5 = 1.wk
  - .... ID 7 = 2.wk
  - .... ID 3 = 1.PwT

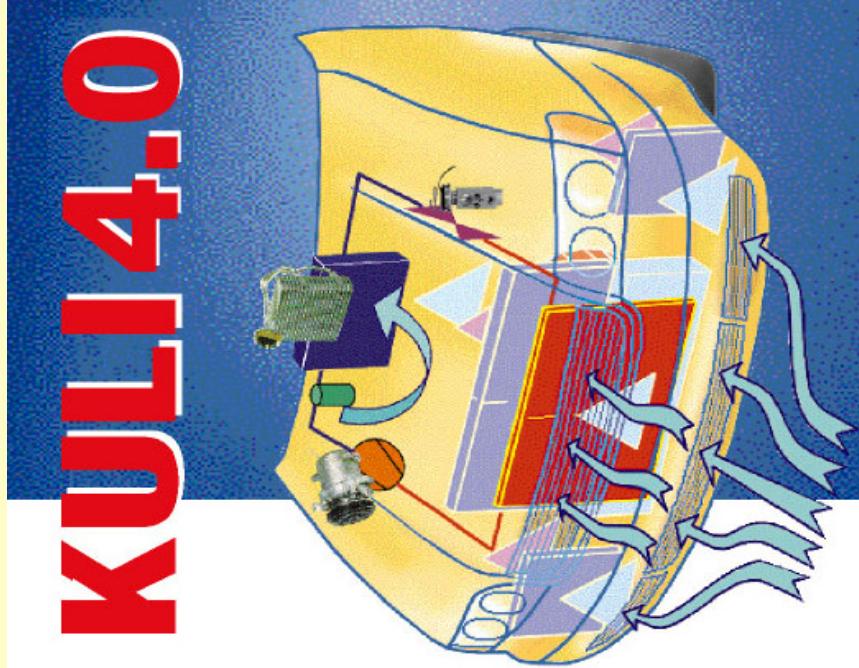


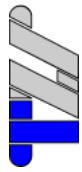
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## KULI 4.0 - Development

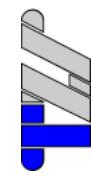
- ◆ Post Processing
- ◆ Online Help
- ◆ Non Symmetric Resistances
- ◆ Regression of Resistances
- ◆ Fan Map
- ◆ Input- and Edit Features





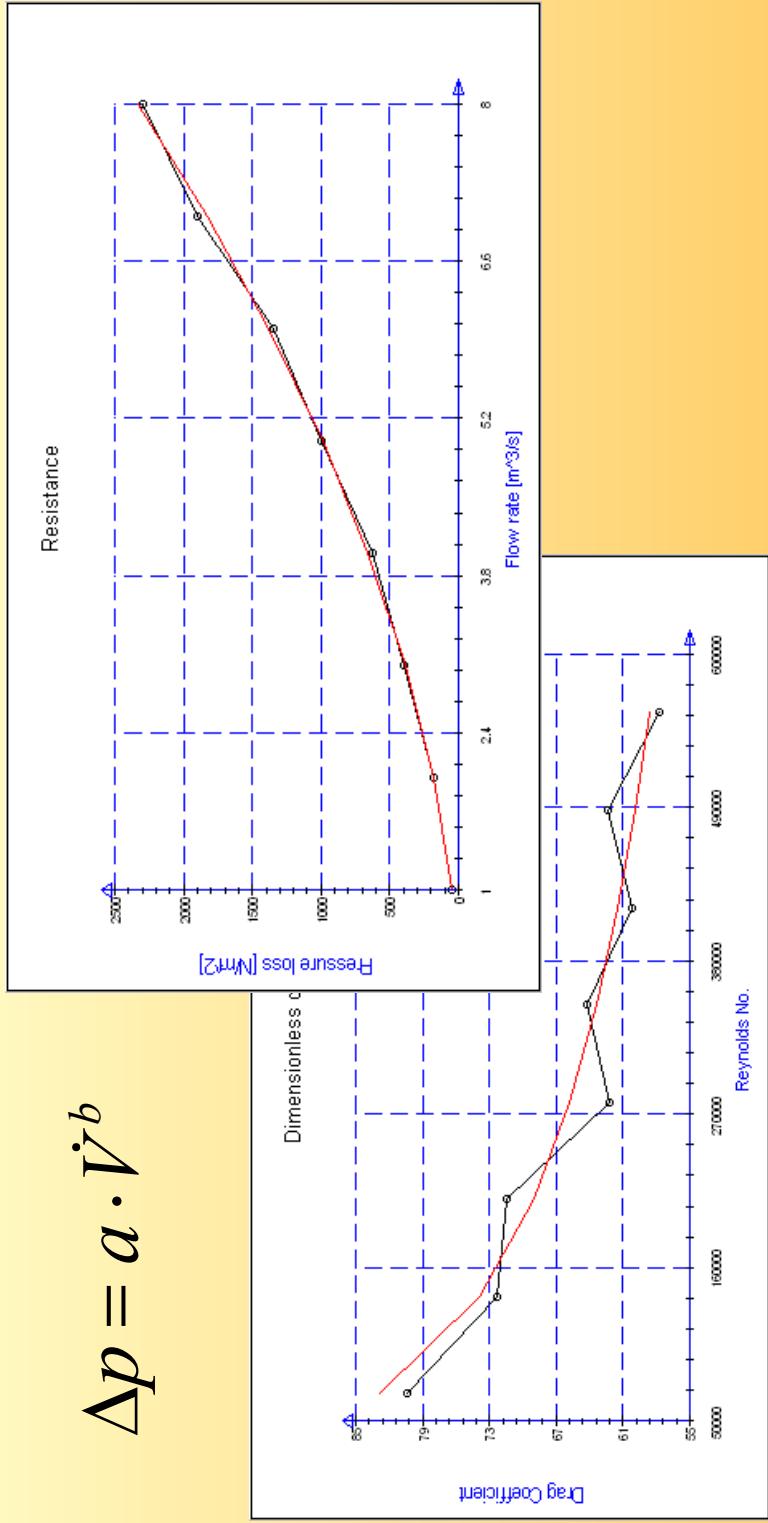
## Post Processing

- ◆ Filtering and Arrangement of Output Data
- ◆ Quick Compare of Variants
- ◆ 2-D Bar Graphs
- ◆ 2-D Graphs of Component Properties and Operating Points
- ◆ 3-D Heat- and Velocity Maps of Components
- ◆ HTML Reports



# Regression of Resistances

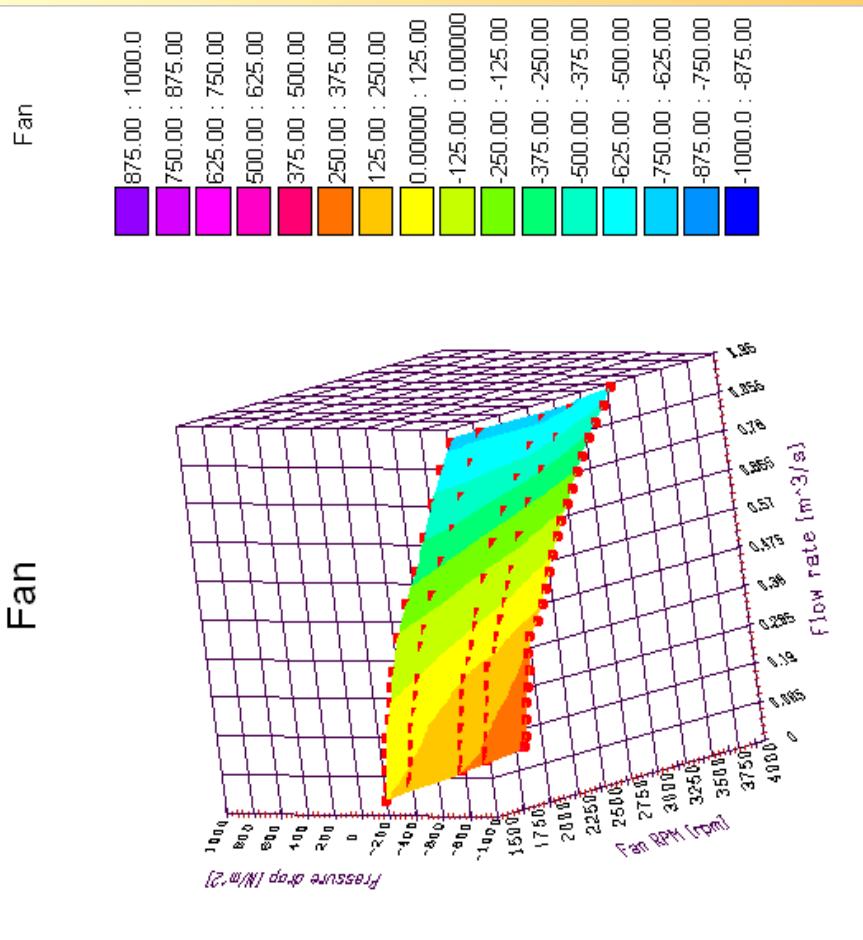
$$\Delta p = a \cdot V^b$$





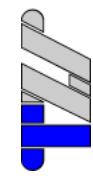
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## Fan Map



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## KULI 4.0 - New Features

### Module KULI ADVANCED

+ CFD - Interface

### Module KULI DRIVE

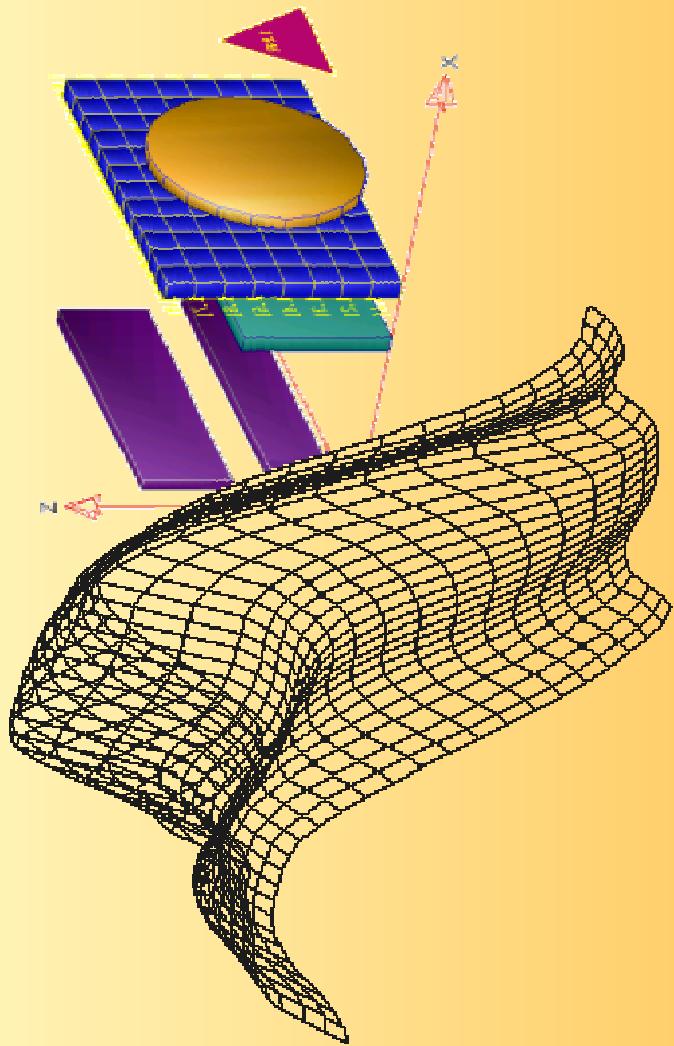
- + Optimization Routines
- + Transient Simulation
- + Improved Air Flow Model
- + Enhanced FLOWMASTER - Interface

### Module KULI AC



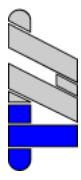
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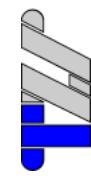
## KULI CFD Interface



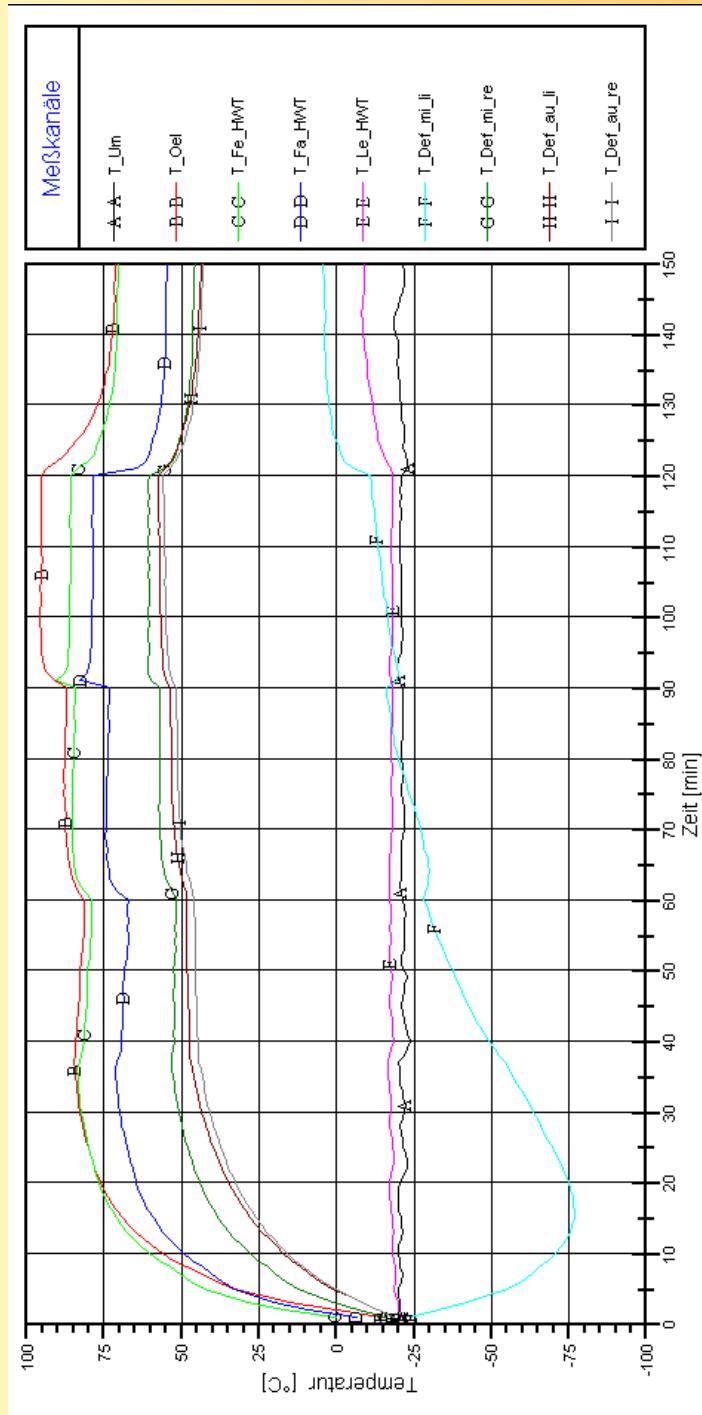
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**KULI Developments**





# Transient Simulation



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## KULI AC

- ◆ Two-phase Model
- ◆ Condensate Separation
- ◆ Air-side Integration
- ◆ Analysis of AC Systems
- ◆ Concept Studies
- ◆ Optimisation

