SyMSpace Roadmap

SyMSpace Days

September 18-19, 2024

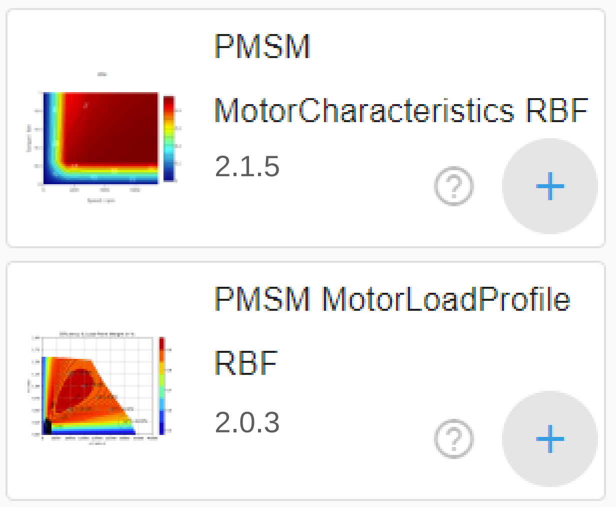
Roadmap

Overview

- Component versioning
- Optimizer web interface
- Improved surrogate models for optimizer
- SyMSpace cloud services
- Keycloak authentication
- Component building tools

Component Versioning

- **Availability of Multiple Versions:**
  Components should be available in various versions to support compatibility with different releases of software environments, such as specific versions of SyMSpace or Python.
- **Flexibility in Updates:**
  Users should have the ability to update to different component versions as needed, facilitating smoother transitions and compatibility management.
- **Visibility Control:**
  Deprecated versions or versions under development should be hidden by default to prevent their accidental use in production environments.



PMSM MotorCharacteristics RBF

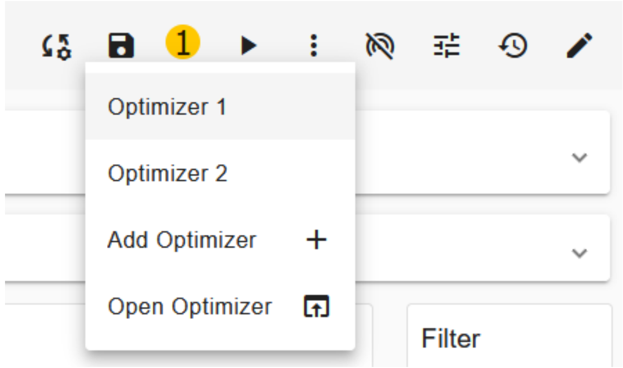
2.1.5

PMSM MotorLoadProfile RBF

2.0.3

Optimizer Web Interface

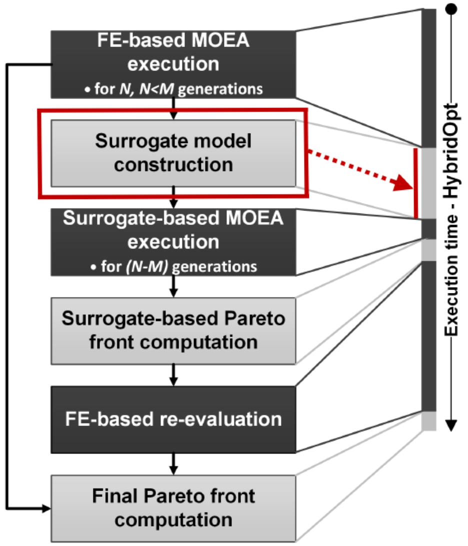
- Integration of Optimizer in SyMSpace Web
- Simplified variable and objective settings
- Several optimizers can be defined for a SyMSpace project



Improved surrogate models for optimizer

Parameter mapping

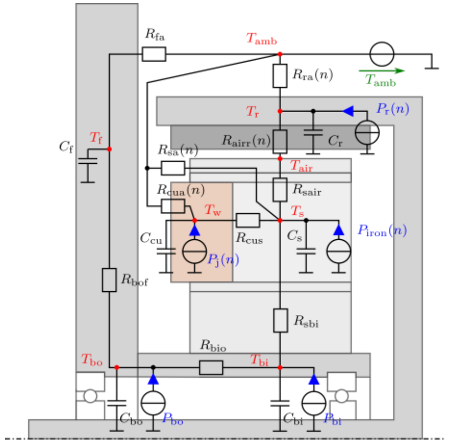
- The relationship between optimization variables and objectives is modeled using an Artificial Neural Network (ANN).
- Training is performed with the Python framework Scikit-learn.
- Compared to the existing solution, the training with this approach is significantly faster.
- In addition to estimating parameters, sensitivities from the gradient are also calculated

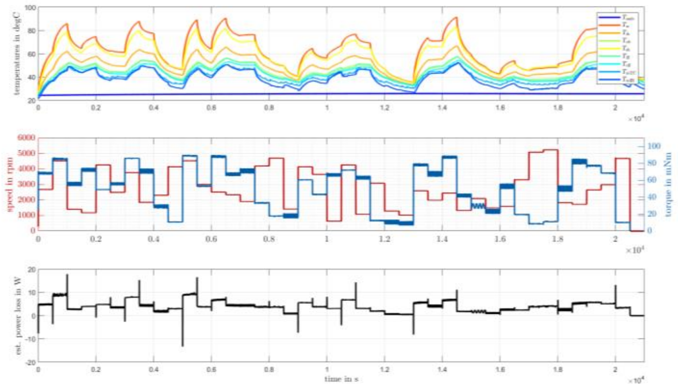

FE-based MOEA execution
• for *N, N<M* generations
Surrogate model construction
Surrogate-based MOEA execution
• for *(N-M)* generations
Surrogate-based Pareto front computation
FE-based re-evaluation
Final Pareto front computation
Execution time - HybridOpt

Thermal models

Parameter fitting based on measurements

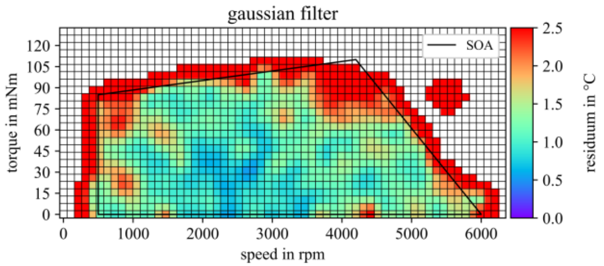
- Thermal networks (LPTN)





- Parameter fitting with optimization

- Evaluation of results



SyMSpace Cloud Service

Server-Based Simulation

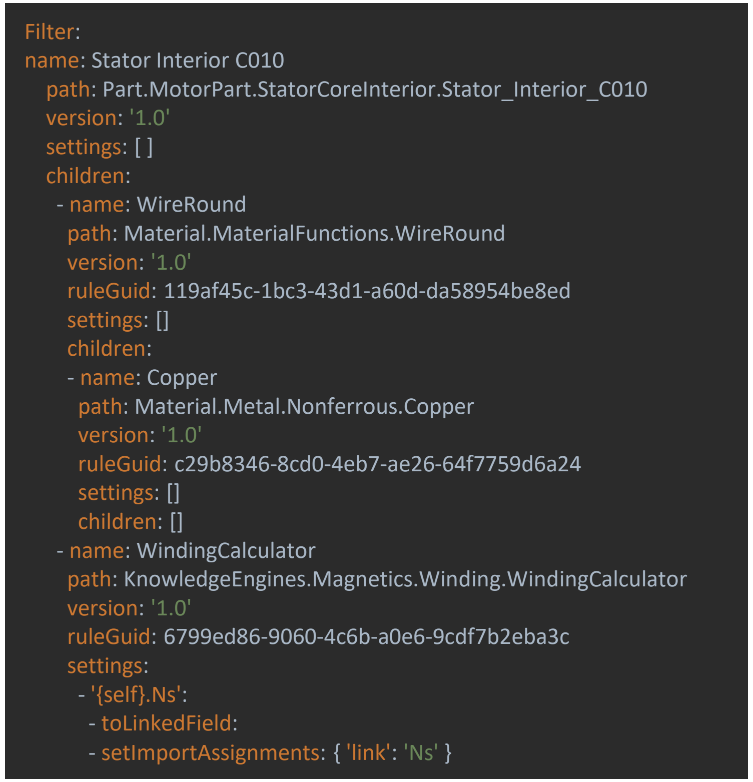
- **Centralized Operation:**
  SyMSpace and simulations are running on a server, eliminating the need for local installation.
- **Data Management:**
  All simulation data is stored on the server.
- **Load Management via Kubernetes:**
  Kubernetes orchestrates load management, efficiently scaling resources to meet demand without manual intervention.

kubernetes

Component Building Tools

Definition of Components

- Simplification of Component development
- User-defined Components and Workflows: Should be easier to develop, enhancing flexibility and user customization.
- Definitions are structured as YAML files based on a schema.



```yaml
Filter:
name: Stator Interior C010
  path: Part.MotorPart.StatorCoreInterior.Stator_Interior_C010
  version: '1.0'
  settings: [ ]
  children:
   - name: WireRound
    path: Material.MaterialFunctions.WireRound
    version: '1.0'
    ruleGuid: 119af45c-1bc3-43d1-a60d-da58954be8ed
    settings: []
    children:
    - name: Copper
     path: Material.Metal.Nonferrous.Copper
     version: '1.0'
     ruleGuid: c29b8346-8cd0-4eb7-ae26-64f7759d6a24
     settings: []
     children: []
   - name: WindingCalculator
    path: KnowledgeEngines.Magnetics.Winding.WindingCalculator
    version: '1.0'
    ruleGuid: 6799ed86-9060-4c6b-a0e6-9cdf7b2eba3c
    settings:
     - '{self}.Ns':
      - toLinkedField:
      - setImportAssignments: { 'link': 'Ns' }
```

Science becomes

reality

LINZ
CENTER OF
MECHATRONICS