

Project report

Project 2B – TSFS09

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1 Examination requirements

The objective of this project is to select, parametrize and validate models of each of the components of the turbocharger. To pass, all models shall be addressed and the solutions (validations) properly described in your report. The project report should include:

- Briefly comment on the validation figures. Discuss the correlation with measurement data. Is your model accurate?
- After validation of models, all estimated parameters in different sub-models must be presented in a table.

2 Assignments

Select, parametrize and validate all necessary sub-models for the turbocharger. For your convenience, they are listed in separate headings below.

All sub-models must be validated. Validation of a model means showing that the model and the data are consistent by comparing the output from the models (static or simulated) to the data from the measurements.

Identify the inputs, outputs and parameters for all sub-models. Adapt the model parameters for the constituent sub-models to the measurement data and show how well the model and measurement data agree. Describe how the validation has been performed for each sub-model and the parameter values you use.

In this section, the models developed in the previous chapter are compared against the measurement data. A template for the turbine flow is provided. Follow the style of this example for the rest of the models.

2.1 Turbine Flow

Parameter(s) value: $k_0 = 0.0054$, $k_1 = 1.4468$

Validation:

The turbine flow parameter (TFP) and pressure ratio (Π_t) were measured and available signals for a non-linear regression fit using `lsqnonlin` in Matlab. The solver terminated in a local minimum after four iterations with a residual norm of 1.553×10^{-7} . The model accuracy is shown in Figure 1.

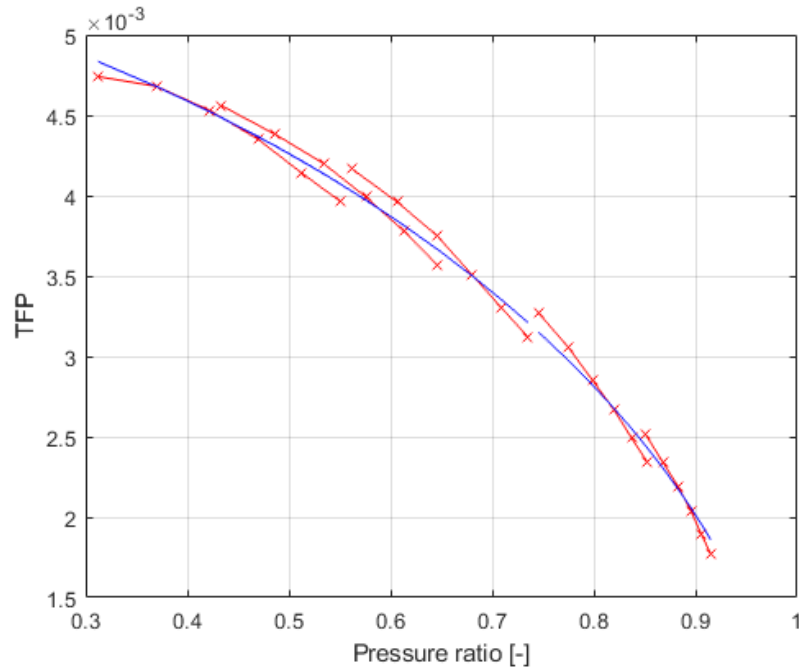


Figure 1: A validation plot of the turbine flow model.

2.2 Turbine Efficiency

Parameter(s) value:

Validation:

2.3 Compressor Flow

Parameter(s) value:

Validation:

2.4 Compressor Efficiency

Parameter(s) value:

Validation:

3 Table of Parameters

All estimated parameters in the different sub-models are summarized in table 1.

Table 1: Estimated parameters in turbocharger sub-models. *Number of empty rows in front of each component is randomly selected and should not be inferred as number of parameters.*

Component	Parameter	Value
Turbine Flow

Turbine Efficiency

Compressor Flow

Compressor Efficiency
