

The flow chart of the processes followed in the in-house developed MATLAB GUI Tool is shown in Figure 12.

7 Practical Implementation - Climate control

The Modelica plant models developed for usage with the MATLAB GUI Tool explained in this paper was related to Climate Controller testing using Modelica plant models [1]. Best practices explained previously were taken care while modeling the plant (vehicle with HVAC system). The climate system controller model was available as a Simulink S-function. The exercise of running the closed loop model establishes the proper compatibility achieved between the developed Modelica plant models with the chosen controller.

The closed loop simulation was very beneficial for validation of control strategies and functionality of control elements related to HVAC like heater, inlet door, etc., comparison of different control strategies and in fuel economy prediction of the vehicle.

8 Future Scope

This GUI tool is developed for a particular plant model architecture, which deals with vehicle with HVAC system simulation. This tool can be quickly reconfigured to work with any plant model architecture of interest for MIL or SIL simulations (Hybrid electric vehicle controller study, etc.). The scope of the tool can also be extended to include processor-in-loop (PIL) and hardware-in-loop (HIL) simulations.

9 Conclusions

This MATLAB based GUI tool enables the user in validating or benchmarking the controller models which are in MATLAB/Simulink against various configurations of plant models which are in Modelica for model-in-loop (MIL) simulations. The most important thing the tool achieves is that it takes the user away from the model development environment so that he remains more objective. The errors that the user can introduce while configuring the plant models in Modelica are eliminated but at a cost that the plant model engineer has to pay by sticking to the guidelines established. It was observed that the time

taken by user to configure a new plant model and get the controller tested has drastically reduced by the use of this tool. The tool helps in reducing the interactions between the user and plant engineer with respect to the plant models which helps reduce the development time.

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