defined in [9], also including the Optimica extensions. In essence, the task of OpenModelica is to read the Modelica and Optimica source code, translate into a flat model description and then export the model and optimization descriptions into an XML format which can be solved by a numerical algorithmic tool.

The exported XML document can then be imported to CasADi tool. The tool supports symbolic import of OCPs via this XML format. This OCP can then be transcribed into a nonlinear programming problem (NLP) using the approach outlined in [10] of Section 5, and solved with one of CasADi's interfaced NLP solvers. The complete tool chain is visualized in Figure 2.

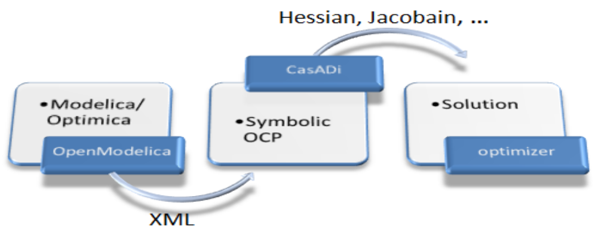

Figure 2: Optimization tool chain for OpenModelica and CasADi

3. Demonstration

In order to present the proposed concept, we demonstrate the solution of an industrial-relevant optimal control problem of diesel engine model. The Diesel-electric powertrain model presented in [11, 10] is a nonlinear mean value engine model (MVEM) containing four states and two control inputs. The problem solved here is a minimum fuel problem for a transient from idle to 170 kW, for an end time of 0.5 s. The control and state trajectories of the optimization results are shown in Figure 3 and Figure 4 respectively.

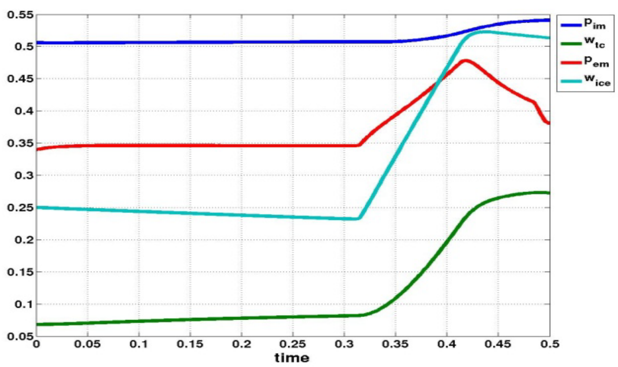

Figure 3: Optimization results of the Diesel-electric powertrain model– state variables.

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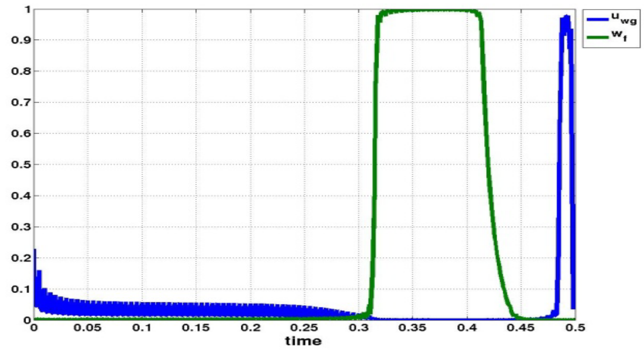

Figure 4: Optimization results the Diesel-electric powertrain model – control variables.

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