

BLOM: Berkeley Library for Optimization Modeling

Sergey Vichik and Anthony Kelman

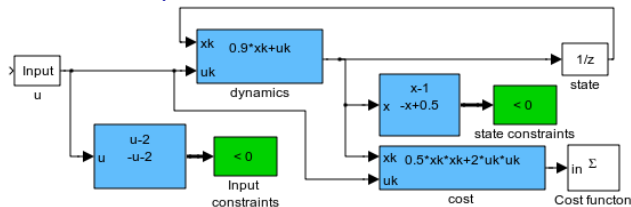
UC Berkeley
Department of Mechanical Engineering
Berkeley, CA
sergv@berkeley.edu,

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What is BLOM ?

- A language of modeling dynamical nonlinear systems for optimization problems, especially MPC.
- Support for the following design phases:
 - ▶ Developing the model with an intuitive block diagram.
 - ▶ Forward simulation and validation of the model.
 - ▶ Automatic export of the optimization problem to a solver.
- Developed to handle non trivial problems
 - ▶ C++ or Matlab code generation.
 - ▶ Explicit evaluation of Jacobian and Hessian.
 - ▶ Proven with problems of tens of thousands variables.
- Eliminates manual problem coding, eases maintenance and assures that the same model used for optimization and for simulation.

"Hello World" example



$$\min_{u_k, x_k} \sum_k 0.5x_k^2 + 2u_k^2$$

$$\text{s.t.} : -2 \leq u_k \leq 2 ; 0.5 \leq x_k \leq 1 ; x_{k+1} = 0.9x_k + u_k \quad (1)$$

- Block library for Simulink:

- ▶ The functional block is a function of the form $\frac{f(x)}{g(x)}$, where f or g are:
 $f, g = \sum_i \prod_j v_{i,j}(x_i)$. $v(x_i)$ can be x^p for any $p \in \mathbb{R}$, $\exp(x)$ or $\log(x)$.
- ▶ Constraint
- ▶ State
- ▶ Cost
- ▶ Input/External variable modifiers