



MOdel based Optimal input Signal dESign Toolbox (version 2: function- and YALMIP-based)

MOOSE2 is a MATLAB toolbox for solving applications-oriented input design problems. MOOSE2 designs the spectrum of the input signal used in the identification experiments.

Input design

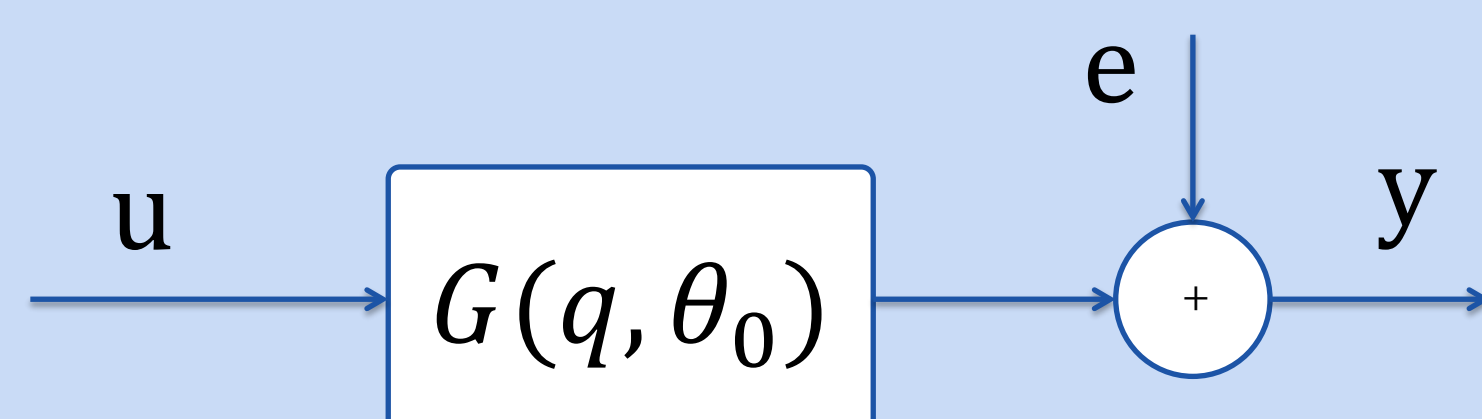
- ❑ **Objective:**
Find input spectrum that minimizes experiment cost
- ❑ **Constraint:**
Guarantee that application and quality constraints on the model are satisfied along with any spectra constraints

Key features

- ❑ MATLAB-based
- ❑ Solves optimization problems via YALMIP
- ❑ Function-based interface, including dedicated functions for
 - ✓ Application constraints
 - ✓ Quality constraints
 - ✓ Spectrum constraints

www.kth.se/moose

MOOSE2 example



- ❑ Minimize input variance
- ❑ Satisfy application constraint
- ❑ FIR input spectrum with 20 lags

$$\begin{aligned} & \underset{\Phi_u(\omega)}{\text{minimize}} && E\{u^2\} \\ & \text{subject to} && \varepsilon_{SI}(0.95) \subseteq \Theta_{app}(100) \\ & && \Phi_u(\omega) \geq 0, \forall \omega \end{aligned}$$

```

% SETUP THE SYSTEM AND MODEL
theta = [10 -9];
Ts = 1;
r_e = 1;
model = idpoly(1,theta,1,1,1,r_e,Ts);

% INPUT DESIGN USING MOOSE2
problem = oidProblem(model,200,'FIR',20);
problem.constraints{1} =
oidApplicationConstraint(VappBiss,100,0.95);
optH = solve(problem,[1 0 0]);

% GENERATE INPUT SIGNAL
u = lsim(optH,randn(200,1));
  
```

Future work:

- ❑ Support for more spectrum types
- ❑ Controller design
- ❑ Support of signal constraints in time domain
- ❑ Toolbox directly connected to optimization solver