MCMC_CLIB

Analysis of a large Sample
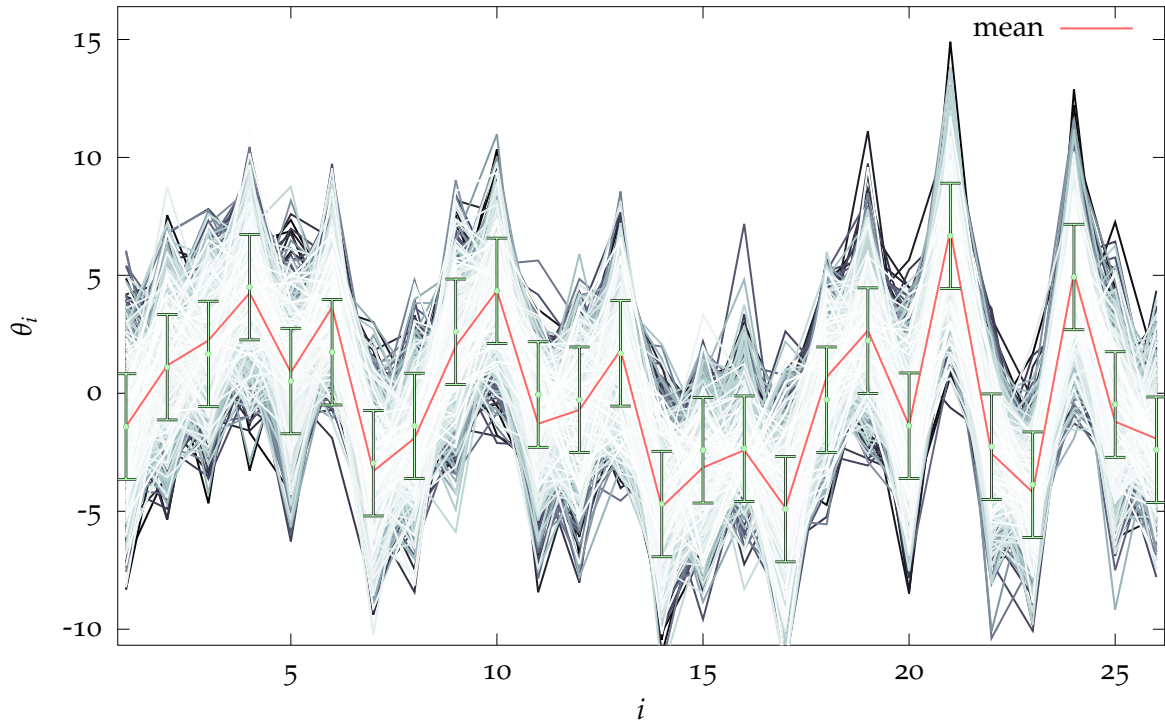
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Figure 1: The Posterior Sample of size $N = 1 \times 10^6$, as obtained from the `MCMC_CLIB`; thinned out using the integrated autocorrelation length $\tau_{\text{int.},l} = 1516(250)$ (estimated using the log-posterior l as observable). The red line indicates the maximum posterior estimate, while the green errorbars indicate the used prior distribution (iid, Gaussian).

The sample was obtained in $t_{\text{s}} = 267385\,\text{s}$. Considering the auto-correlation, the

effective sampling speed is:

$$v = \frac{N}{2\tau_{\text{int.},l}t_{\text{s}}} = 12(2) \times 10^{-4}\,\text{s}^{-1}\,.$$
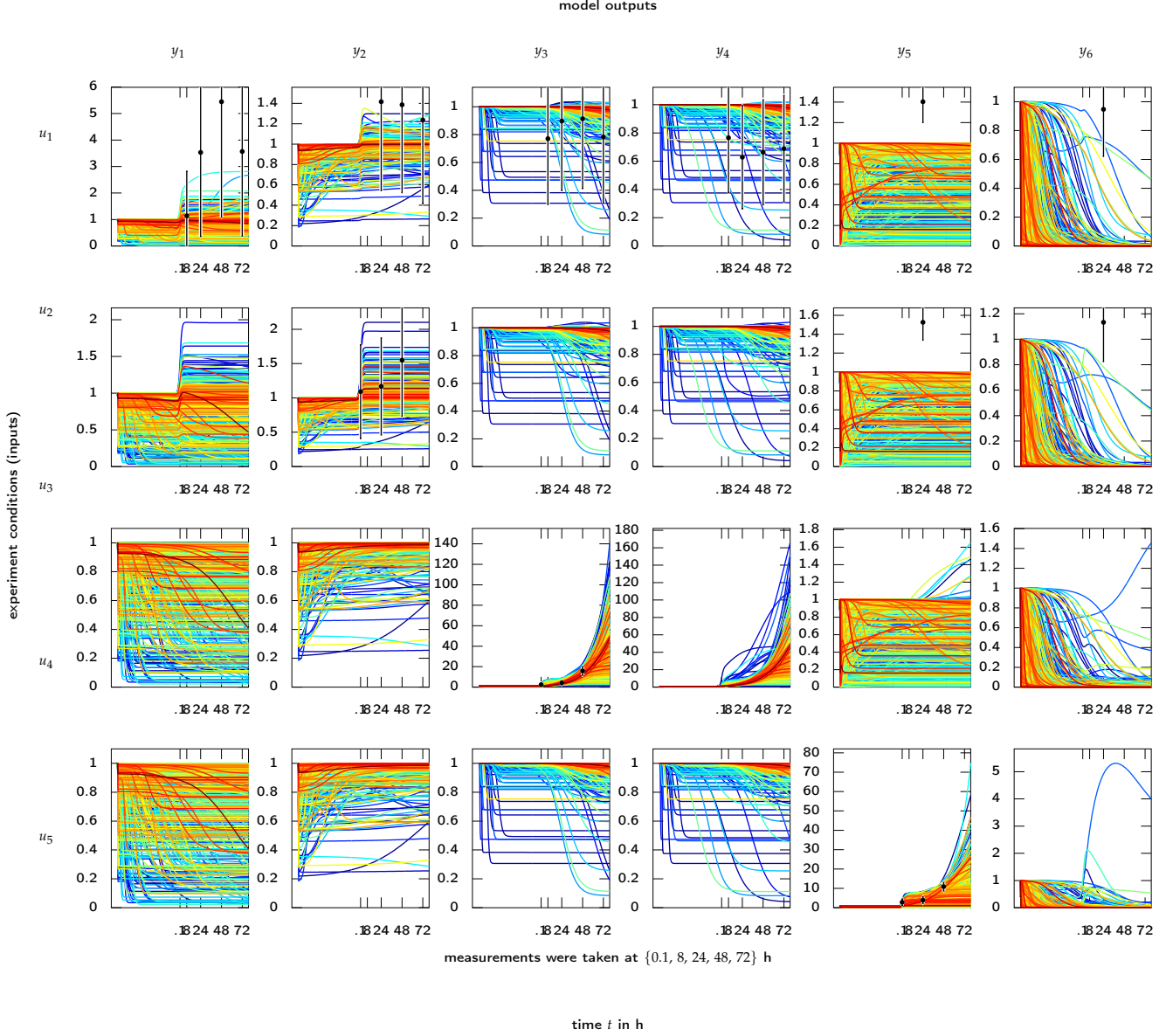
(1)

Figure 2: output trajectories per parameter sample member; to reduce the number of lines these trajectory lines are once again plotted for every 3534th $(2(\tau_{\text{int.},l} + \delta_\tau))$ parameter in the parameter sample. The green, vertical errorbars represent the data and its measurement error estimation. The data is sparse (not all outputs were observed at all measurement instances. The model does not fit all data points.)

tuning duration	1000 points
target acceptance a_0	0.50
observed acceptance a	0.27
auto-correlation length $\tau_{\text{int.},l}$	1516(250)
failed Likelihood evaluations [`CVODES`]	16

Table 1: Sample Properties.

Listing 1: Model

```xml
1  <?xml version="1.0" ?>
   <VectorField Name="ODEmodel11S26P4U" Description="A model for testing purposes">
   <Parameter Name="theta_1" DefaultValue="1.0"/>
   <Parameter Name="theta_2" DefaultValue="1.0"/>
   <Parameter Name="theta_3" DefaultValue="1.0"/>
6  <Parameter Name="theta_4" DefaultValue="1.0"/>
   <Parameter Name="theta_5" DefaultValue="1.0"/>
   <Parameter Name="theta_6" DefaultValue="1.0"/>
   <Parameter Name="theta_7" DefaultValue="1.0"/>
   <Parameter Name="theta_8" DefaultValue="1.0"/>
11 <Parameter Name="theta_9" DefaultValue="1.0"/>
   <Parameter Name="theta_10" DefaultValue="1.0"/>
   <Parameter Name="theta_11" DefaultValue="1.0"/>
   <Parameter Name="theta_12" DefaultValue="1.0"/>
   <Parameter Name="theta_13" DefaultValue="1.0"/>
16 <Parameter Name="theta_14" DefaultValue="1.0"/>
   <Parameter Name="theta_15" DefaultValue="1.0"/>
   <Parameter Name="theta_16" DefaultValue="1.0"/>
   <Parameter Name="theta_17" DefaultValue="1.0"/>
   <Parameter Name="theta_18" DefaultValue="1.0"/>
21 <Parameter Name="theta_19" DefaultValue="1.0"/>
   <Parameter Name="theta_20" DefaultValue="1.0"/>
   <Parameter Name="theta_21" DefaultValue="1.0"/>
   <Parameter Name="theta_22" DefaultValue="1.0"/>
   <Parameter Name="theta_23" DefaultValue="1.0"/>
26 <Parameter Name="theta_24" DefaultValue="1.0"/>
   <Parameter Name="theta_25" DefaultValue="1.0"/>
   <Parameter Name="theta_26" DefaultValue="1.0"/>
   <Parameter Name="u1" DefaultValue="0.0"/>
   <Parameter Name="u2" DefaultValue="0.0"/>
31 <Parameter Name="u3" DefaultValue="0.0"/>
   <Parameter Name="u4" DefaultValue="0.0"/>
   <Expression Name="logistic" Formula="1.0/(1+exp(-t))"/>
   <Expression Name="U1t" Formula="u1*logistic"/>
   <Expression Name="U2t" Formula="u2*logistic"/>
36 <Expression Name="U3t" Formula="u3*logistic"/>
   <Expression Name="U4t" Formula="u4*logistic"/>
   <Expression Name="S1" Formula="X4+X5"/>
   <Expression Name="S2" Formula="(theta_22)*X9*X7"/>
```

```xml
   <Expression Name="A1"  Formula="(theta_1)*X2"/>
   <Expression Name="A2"  Formula="(theta_2)*X1"/>
   <Expression Name="A3"  Formula="(theta_3)*X3*X2"/>
   <Expression Name="A4"  Formula="(theta_4)*X4"/>
   <Expression Name="A5"  Formula="(theta_10)*X4"/>
   <Expression Name="A51" Formula="(theta_10)*X5"/>
   <Expression Name="A6"  Formula="(theta_13)*X7"/>
   <Expression Name="A7"  Formula="(theta_14)*S1*X6"/>
   <Expression Name="A8"  Formula="(theta_19)*X10*S1"/>
   <Expression Name="A9"  Formula="(theta_20)*X8"/>
   <Expression Name="A10" Formula="(theta_22)*X11*X7"/>
   <Expression Name="A11" Formula="(theta_21)*X9"/>
   <StateVariable Name="X1"
                  DefaultInitialCondition="1000.0"
                  Formula="A1-A2+(theta_5)*(0.1+S2)-(theta_7)*X1" />
   <StateVariable Name="X2"
                  DefaultInitialCondition="1000.0"
                  Formula="-A1+A2-(theta_8)*X2" />
   <StateVariable Name="X3"
                  DefaultInitialCondition="1000.0"
                  Formula="-A3+A4+(theta_6)+(theta_12)*U2t-(theta_9)*X3" />
   <StateVariable Name="X4"
                  DefaultInitialCondition="1000.0"
                  Formula="A3-A4-A5" />
   <StateVariable Name="X5"
                  DefaultInitialCondition="0.0"
                  Formula="+(theta_11)*U1t-A51" />
   <StateVariable Name="X6"
                  DefaultInitialCondition="1000.0"
                  Formula="A6-A7+(theta_15)+(theta_18)*U3t-(theta_16)*X6" />
   <StateVariable Name="X7"
                  DefaultInitialCondition="1000.0"
                  Formula="-A6+A7-(theta_17)*X7" />
   <StateVariable Name="X8"
                  DefaultInitialCondition="1000.0"
                  Formula="+A8-A9-(theta_24)*X8" />
   <StateVariable Name="X9"
                  DefaultInitialCondition="1000.0"
                  Formula="+A9-A11" />
   <StateVariable Name="X10"
                  DefaultInitialCondition="1000.0"
                  Formula="-A8+A10" />
   <StateVariable Name="X11"
                  DefaultInitialCondition="1000.0"
                  Formula="-A10+A11+(theta_23)+(theta_26)*U4t-(theta_25)*X11" />
   <Function Name="Y1"  Formula="(X4+X5)"/>
   <Function Name="Y2"  Formula="(X3+X5)"/>
   <Function Name="Y3"  Formula="(X7+X6)"/>
   <Function Name="Y4"  Formula="(X6)"/>
```

```
   <Function Name="Y5" Formula="(X10+X9+X11+X8)"/>
   <Function Name="Y6" Formula="X8"/>
91 </VectorField>
```