Plots of pMCMC for state and parameter estimation

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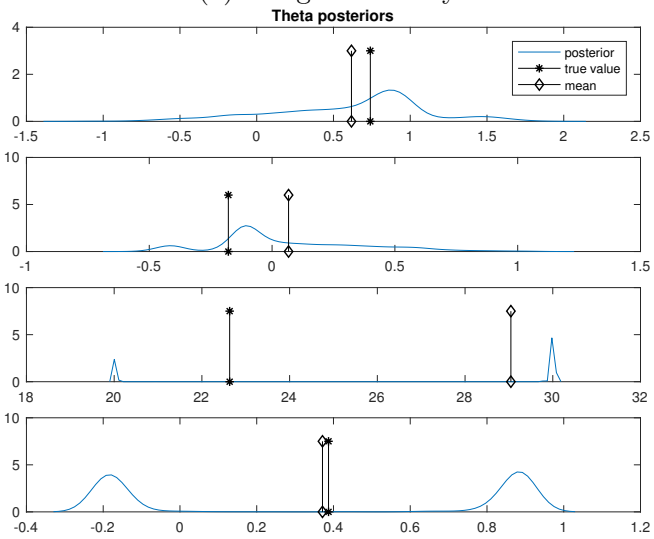
Abstract: We test the pMCMC for state and parameter estimation on. Consider different observation functions: even $0.05x^2$ and odd $0.05x^3$;
different priors: uniform and Gaussian.

1 State and Parameter estimation with oddObs + Uniform-prior

Setting: Uniform prior. The true parameter is sampled from the prior distribution. $tN = 100$.

Figure 1: Parameter estimation

(a) Marginal density



(b) Scatter plots

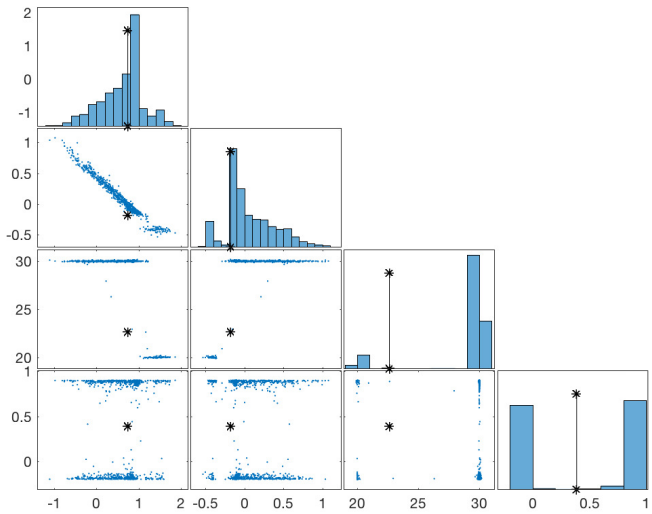
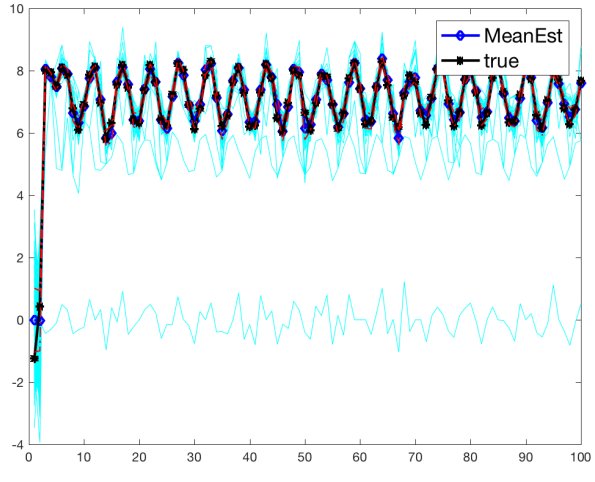
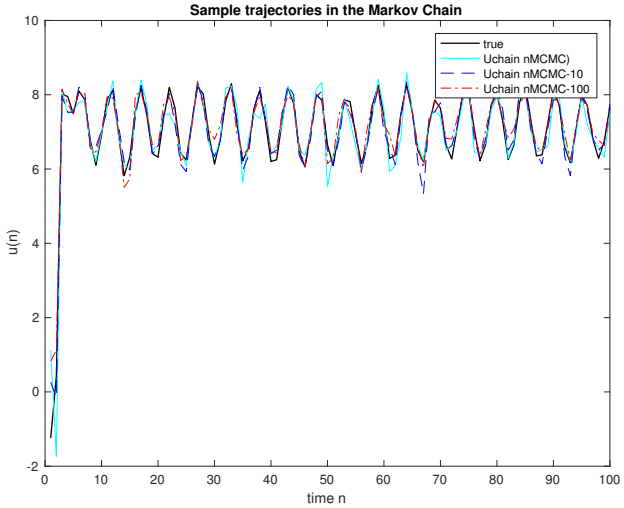


Figure 2: State estimation

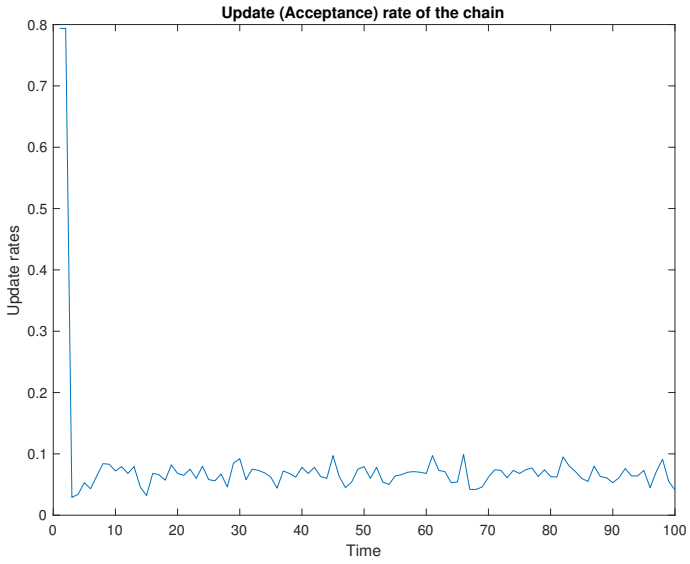


(a) Ensemble trajectories



(b) The last few steps in the chain

Figure 3: Update rate



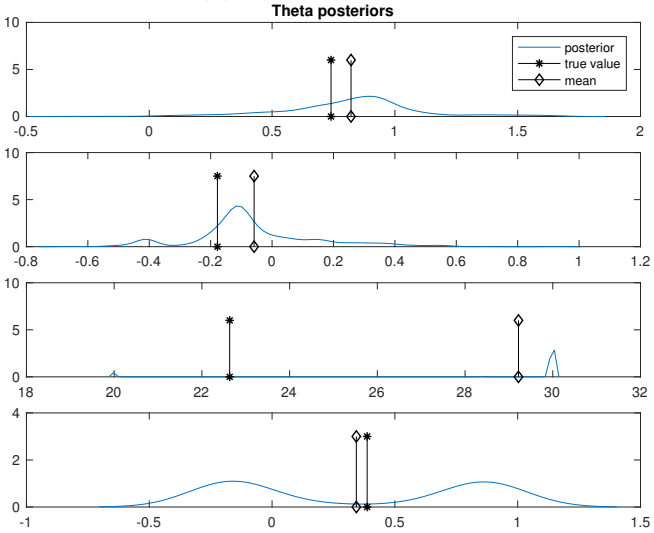
Summary: the parameter is not well identified, especially, the distribution of θ_3, θ_3 seems unreasonable.

2 State and Parameter estimation with EvenObs + Uniform-prior

Setting: Uniform prior. The true parameter is sampled from the prior distribution. $tN = 100$.

Figure 4: Parameter estimation

(a) Marginal density



(b) Scatter plots

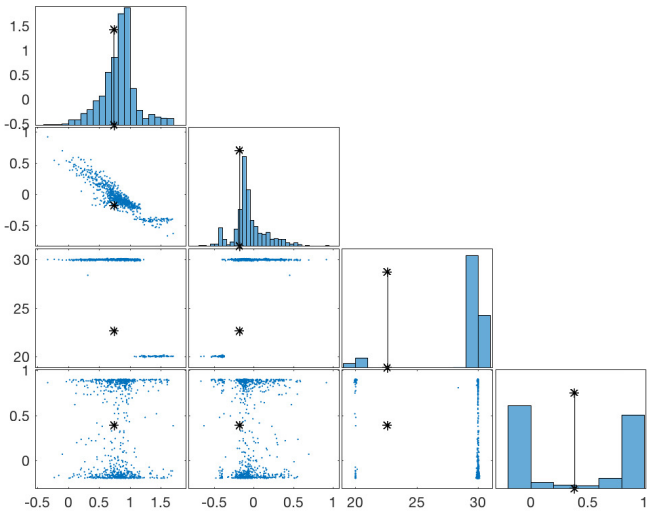
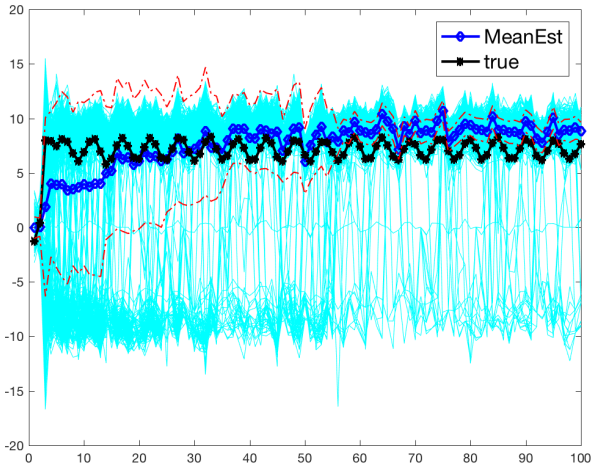
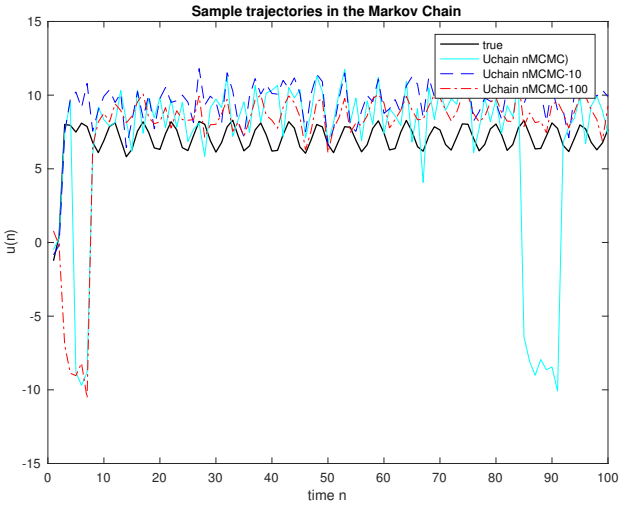


Figure 5: State estimation



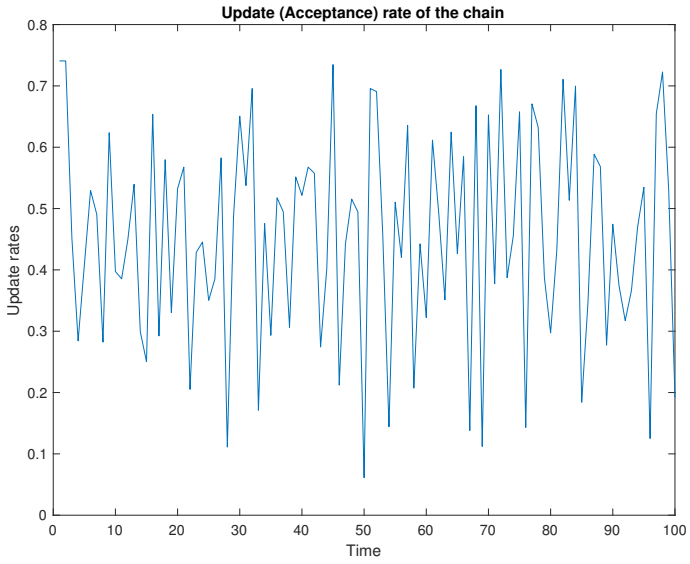
(a) Ensemble trajectories



(b) The last few steps in the chain

Summary: the parameter is not well identified, especially, the distribution of θ_3, θ_3 seems unreasonable.

Figure 6: Update rate

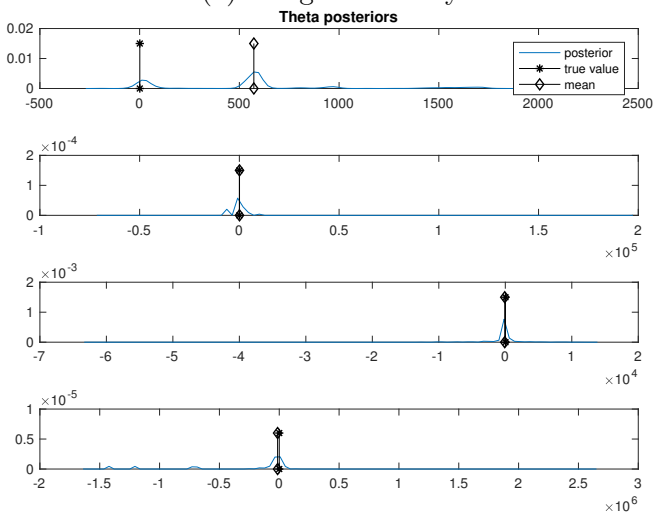


3 State and Parameter estimation with OddObs + Gaussian-prior

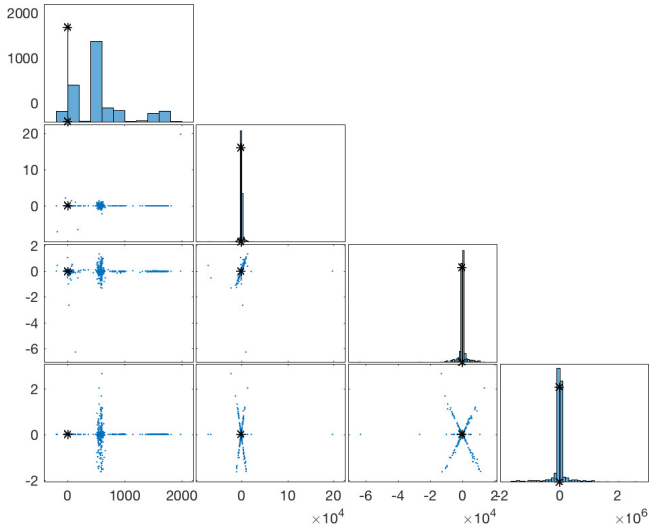
Setting: Uniform prior. The true parameter is sampled from the prior distribution. $tN = 100$.

Figure 7: Parameter estimation

(a) Marginal density

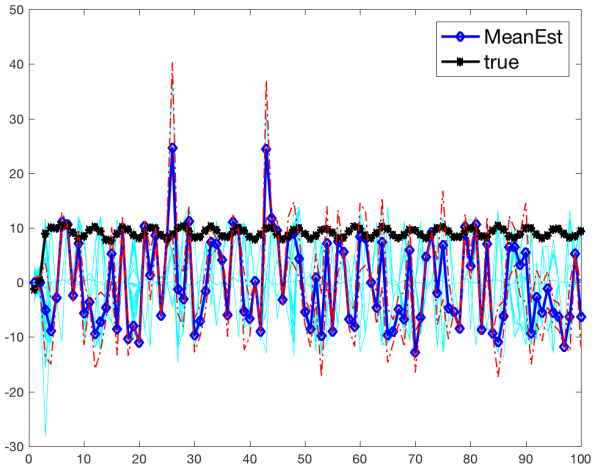


(b) Scatter plots

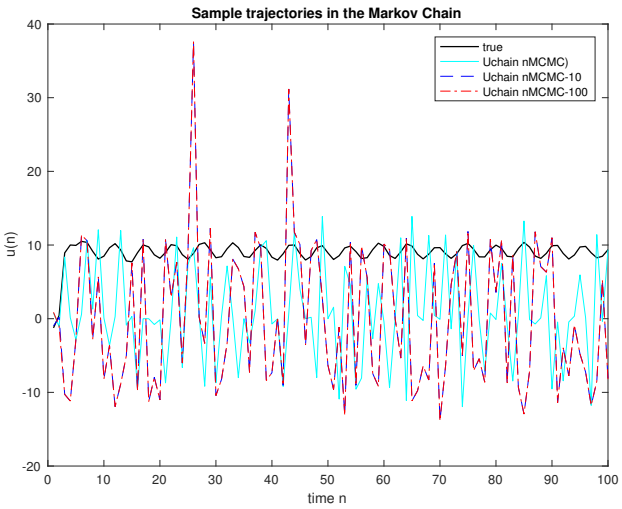


Summary: the parameters are in wrong range – Gaussian prior does not put strong enough constraint. Or, Check for mistake in the sampling of the parameters.

Figure 8: State estimation

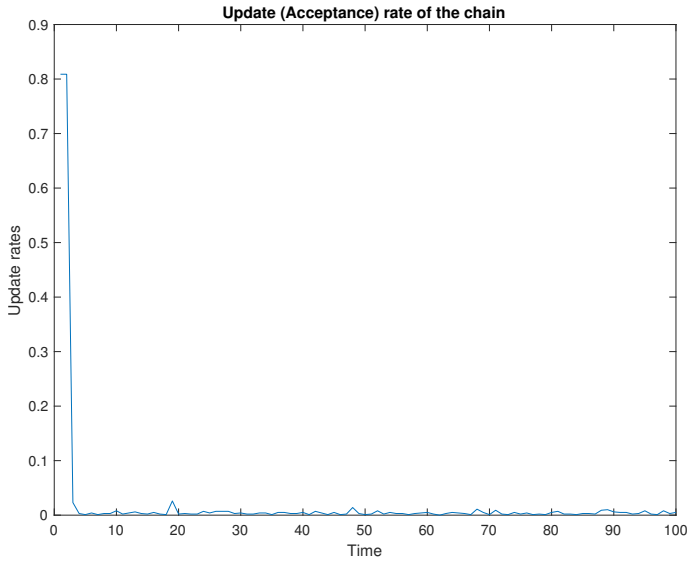


(a) Ensemble trajectories



(b) The last few steps in the chain

Figure 9: Update rate



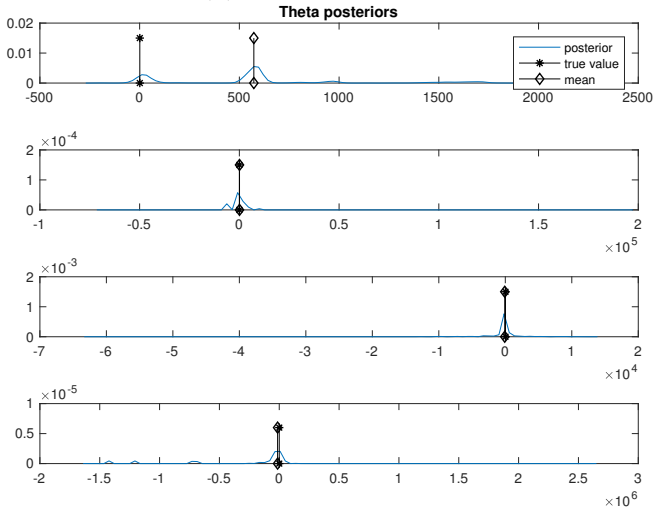
4 State and Parameter estimation with EvenObs + Gaussian-prior

Setting: Uniform prior. The true parameter is sampled from the prior distribution. $tN = 100$.

Summary: the parameter is not well identified, especially, the distribution of θ_3, θ_3 seems unreasonable.

Figure 10: Parameter estimation

(a) Marginal density



(b) Scatter plots

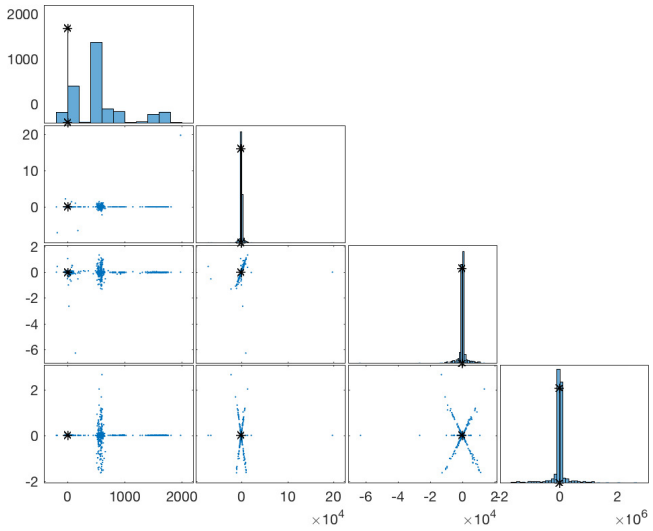
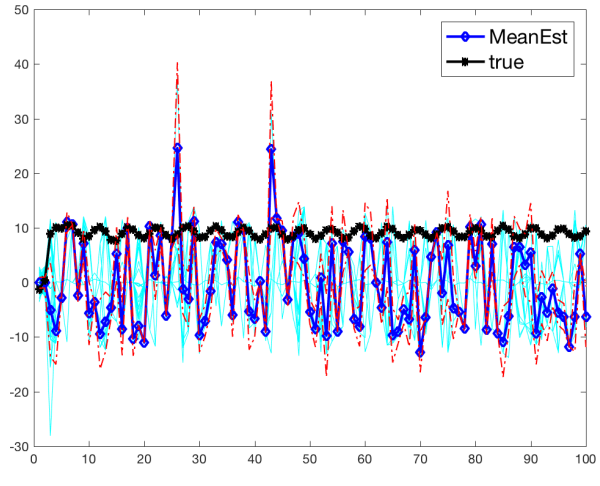
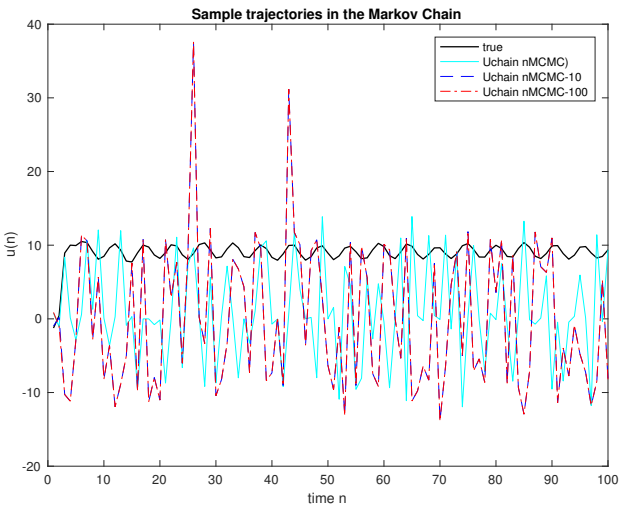


Figure 11: State estimation



(a) Ensemble trajectories



(b) The last few steps in the chain

Figure 12: Update rate