Summary of results for GBM_alpha_1_sigma_2_x0_100

June 9, 2020

M = 10

m = 1

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

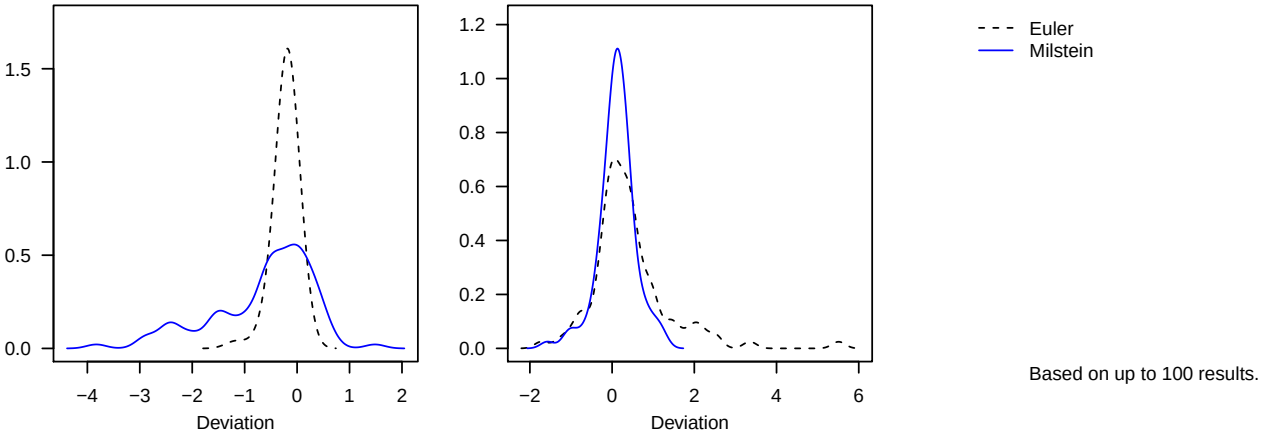

Table 1: RMSE

	alpha	sigma2
Euler	0.304	1.059
Milstein	1.164	0.462

Posterior median

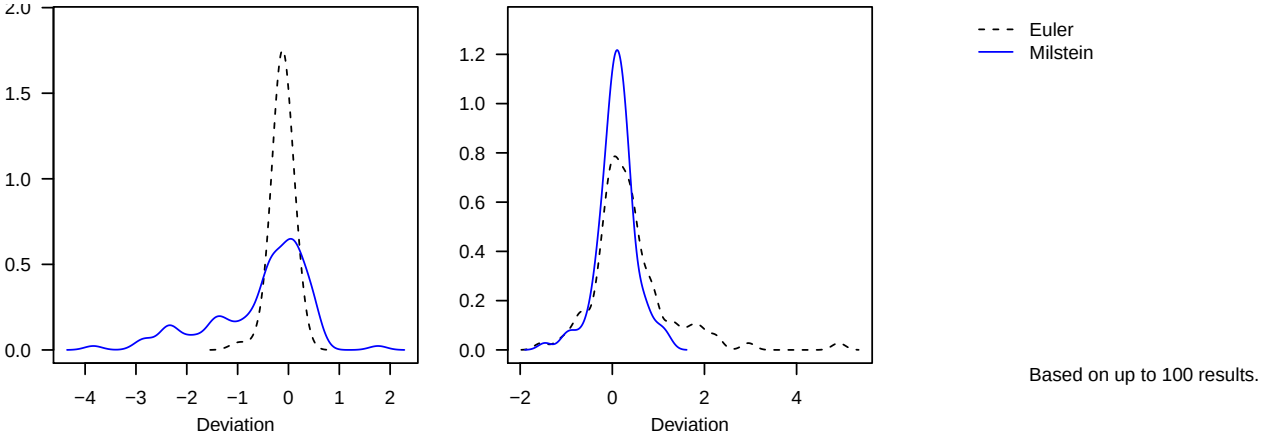

Table 2: RMSE

	alpha	sigma2
Euler	0.230	0.945
Milstein	1.111	0.424

Posterior variance and covariance

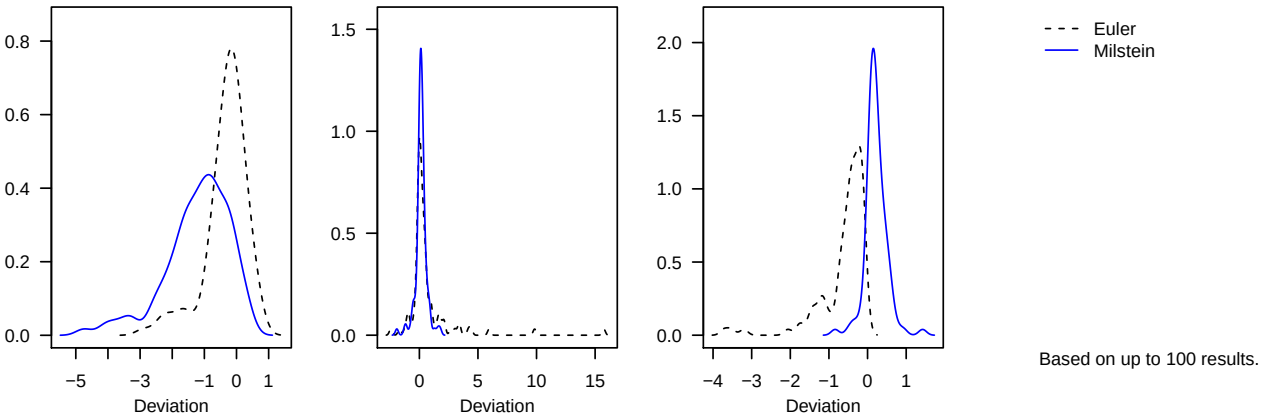

Table 3: RMSE

	alpha	sigma2	covariance
Euler	0.745	2.254	0.909
Milstein	1.586	0.501	0.346

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
Euler	26648991	888120	1218564	229564
Milstein	7487530	186164	145030	75716

Acceptance rates

	ARparam mean	ARparam sd
td_E	0.593	0.013
td_M	0.395	0.087

m = 2

```
mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0

total # of negative proposals:
```

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
5407	1257639	601595	0

```
ratio of negative proposals and number of iterations:
```

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0.0000000	0.0000012	0.0000007	0
max	0.0007643	0.0197556	0.0265252	0
median	0.0000000	0.0003267	0.0005302	0
mean	0.0000196	0.0013885	0.0021189	0

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Posterior mean

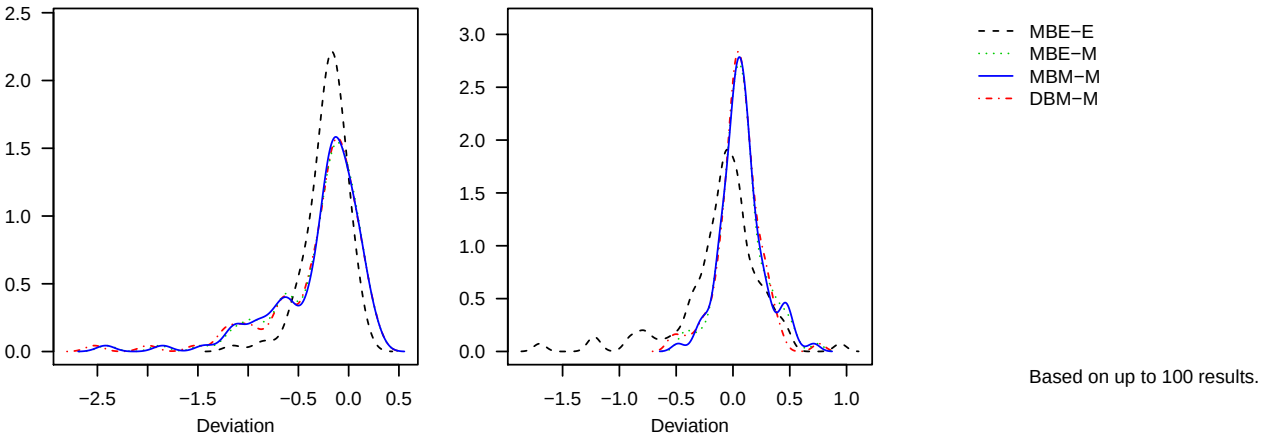


Table 8: RMSE

	alpha	sigma2
MBE-E	0.299	0.384
MBE-M	0.538	0.211
MBM-M	0.539	0.206
DBM-M	0.561	0.195

Posterior median

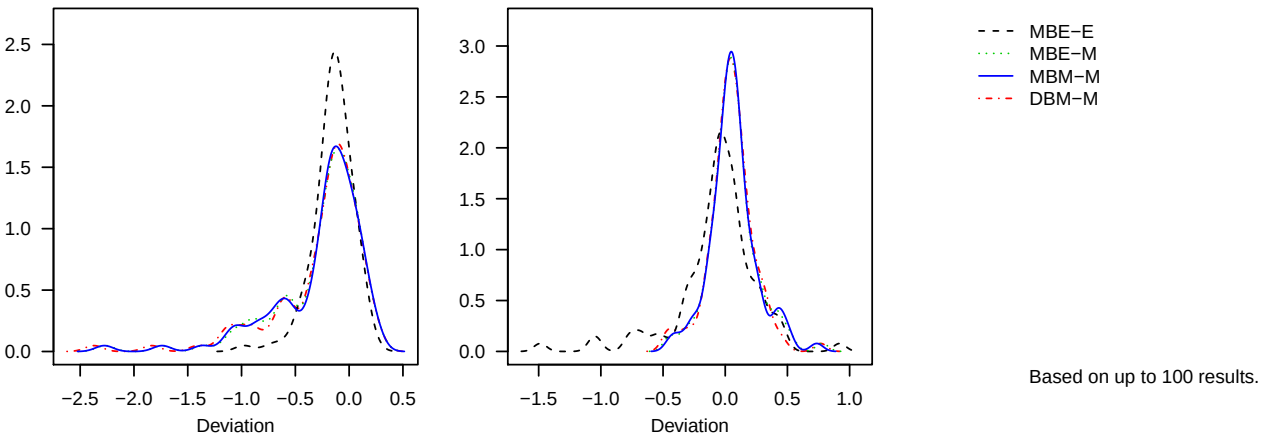


Table 9: RMSE

	alpha	sigma2
MBE-E	0.236	0.336
MBE-M	0.501	0.202
MBM-M	0.506	0.199
DBM-M	0.521	0.190

Posterior variance and covariance

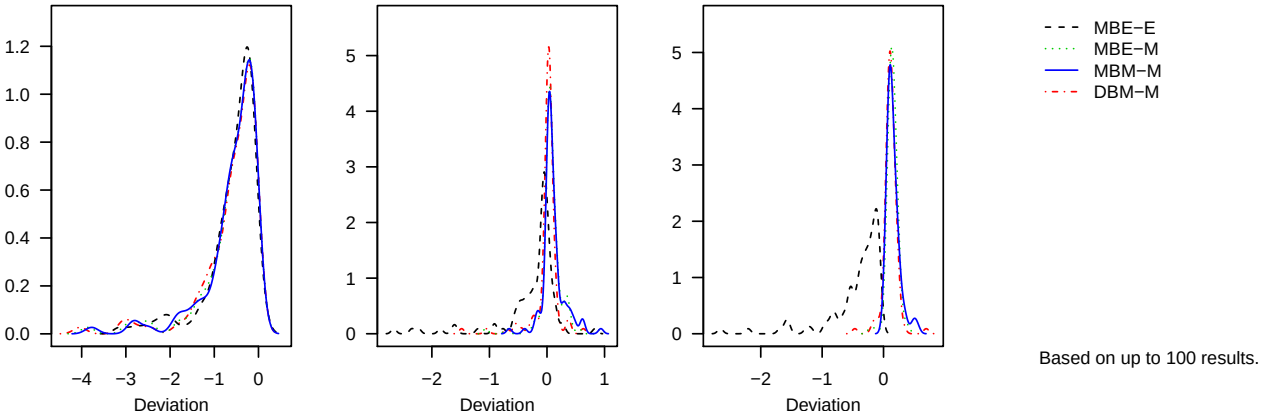


Table 10: RMSE

	alpha	sigma2	covariance
MBE-E	0.850	0.593	0.630
MBE-M	0.905	0.222	0.165
MBM-M	0.886	0.224	0.186
DBM-M	0.939	0.246	0.160

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	9015192	279808	246491	45049
MBE-M	2830801	89107	28411	18188
MBM-M	332424	7726	6588	3104
DBM-M	2742274	59915	31756	21427

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.784	0.055	0.530	0.010
MBE-M	0.704	0.084	0.442	0.063
MBM-M	1.000	0.000	0.443	0.062
DBM-M	0.752	0.082	0.443	0.062

m = 5

`mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 116`

`total # of negative proposals:`

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
7	47467	23987	27

`ratio of negative proposals and number of iterations:`

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0.0e+00	0.0000000	0.0000000	0.0000000
max	1.3e-06	0.0013412	0.0029764	0.0001385
median	0.0e+00	0.0000094	0.0000219	0.0000000
mean	0.0e+00	0.0000647	0.0001546	0.0000034

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

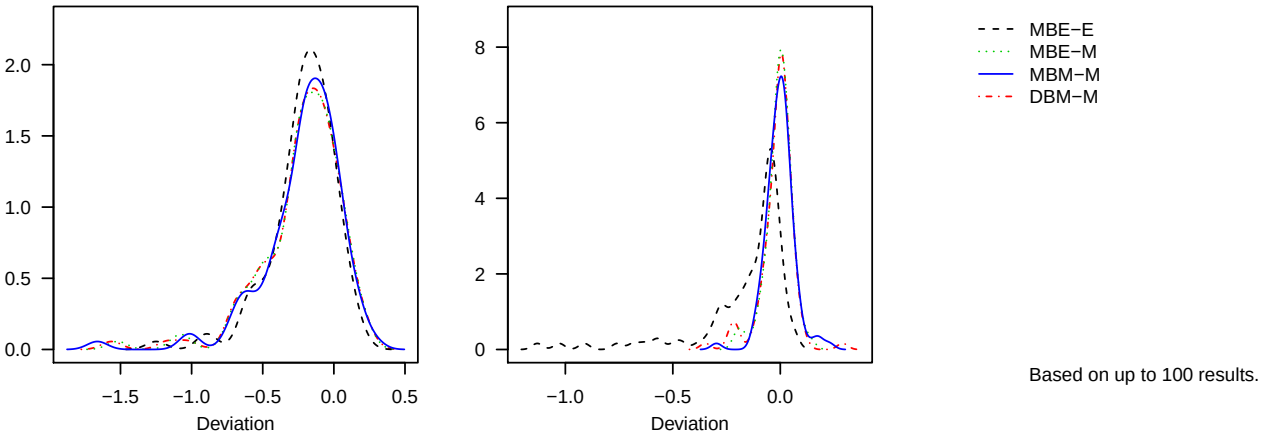


Table 15: RMSE

	alpha	sigma2
MBE-E	0.314	0.273
MBE-M	0.359	0.060
MBM-M	0.355	0.065
DBM-M	0.364	0.080

Posterior median

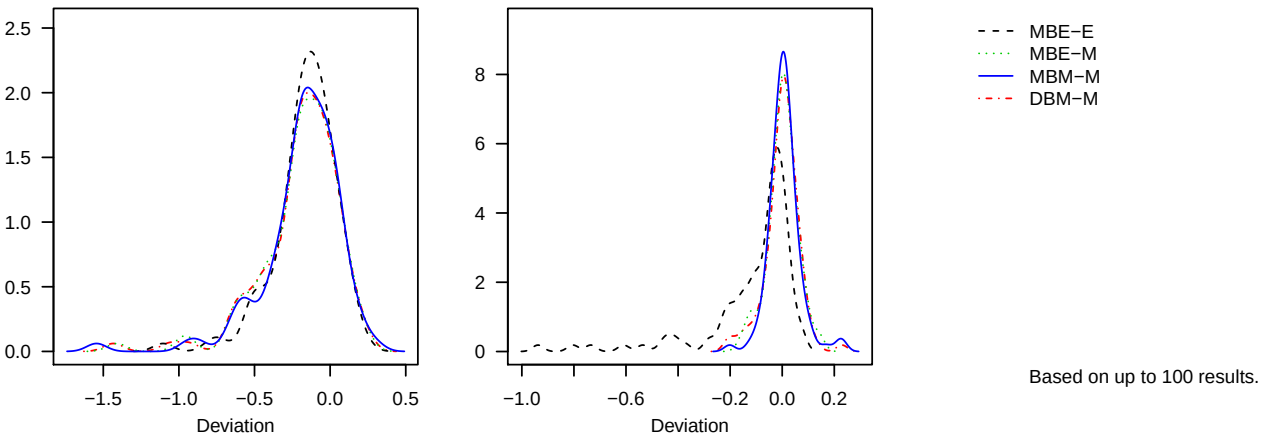


Table 16: RMSE

	alpha	sigma2
MBE-E	0.265	0.214
MBE-M	0.323	0.057
MBM-M	0.319	0.059
DBM-M	0.327	0.065

Posterior variance and covariance

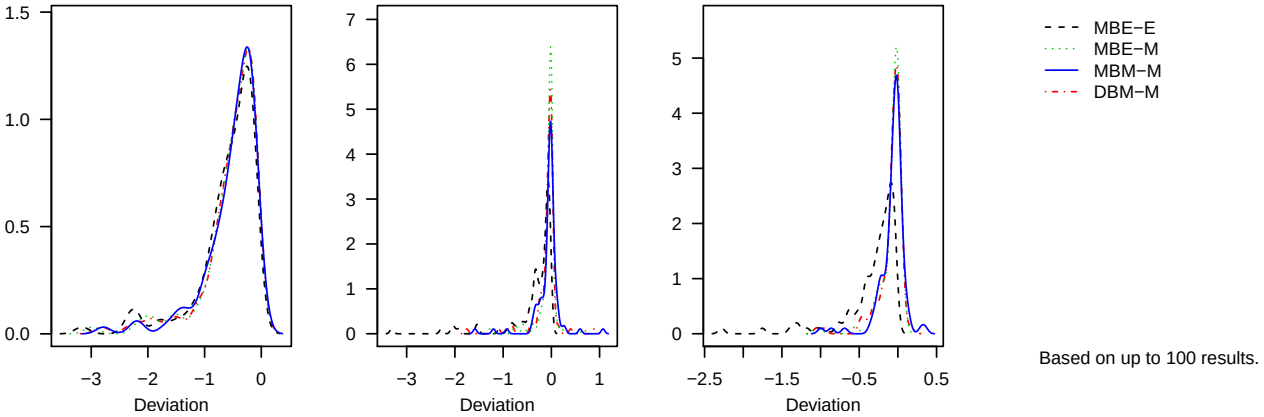


Table 17: RMSE

	alpha	sigma2	covariance
MBE-E	0.827	0.654	0.503
MBE-M	0.738	0.218	0.194
MBM-M	0.717	0.283	0.192
DBM-M	0.739	0.296	0.201

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	7274387	201899	82976	14080
MBE-M	1544016	34696	10818	4108
MBM-M	82345	2641	844	251
DBM-M	1489759	40163	11825	4265

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.851	0.035	0.399	0.007
MBE-M	0.782	0.053	0.380	0.011
MBM-M	0.939	0.034	0.380	0.012
DBM-M	0.833	0.045	0.380	0.010

	ARpath mean	ARpath sd	ARparam mean	ARparam sd

M = 20

m = 1

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

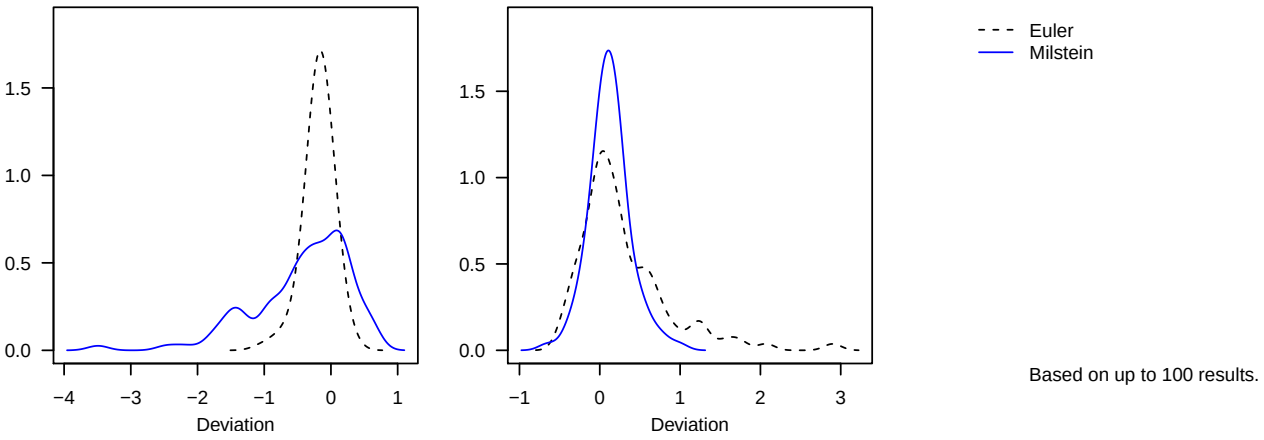


Table 20: RMSE

	alpha	sigma2
Euler	0.282	0.638
Milstein	0.851	0.282

Posterior median

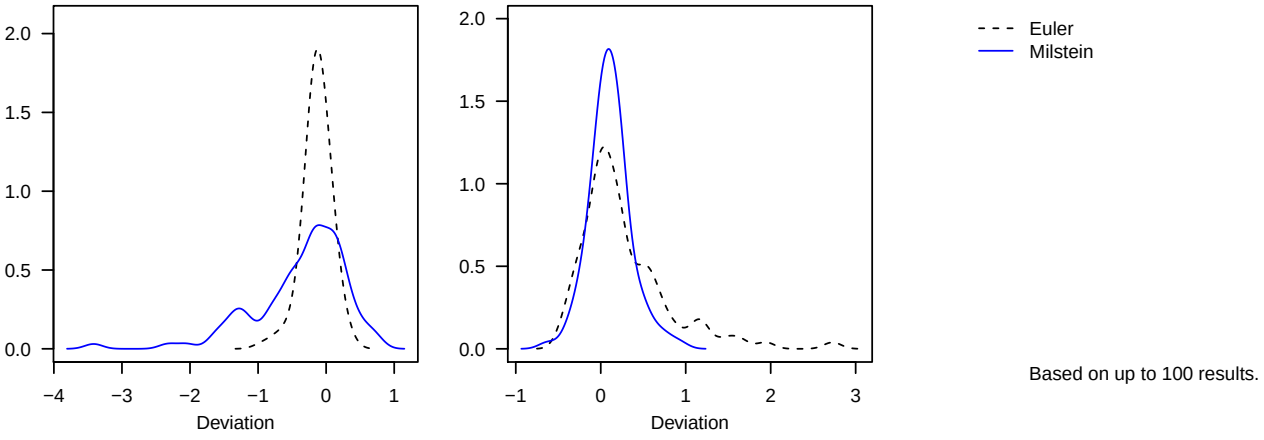


Table 21: RMSE

	alpha	sigma2
Euler	0.244	0.600
Milstein	0.780	0.265

Posterior variance and covariance

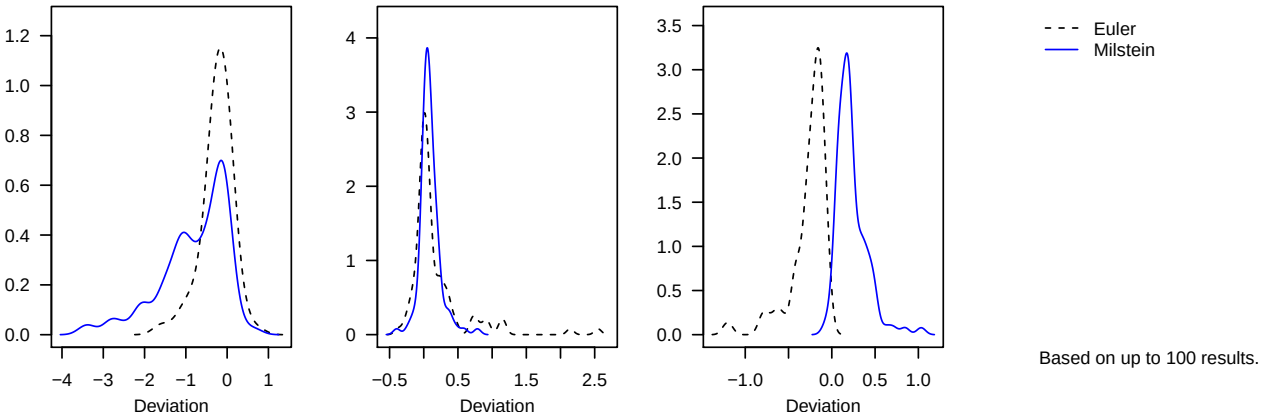


Table 22: RMSE

	alpha	sigma2	covariance
Euler	0.456	0.471	0.346
Milstein	1.158	0.176	0.289

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
Euler	25134301	879055	1273744	200463
Milstein	4454863	119491	146362	59491

Acceptance rates

	ARparam mean	ARparam sd
td_E	0.518	0.008
td_M	0.425	0.060

m = 2

`mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0`

`total # of negative proposals:`

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
0	21456	7042	0

`ratio of negative proposals and number of iterations:`

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0	0.0000000	0.0000000	0
max	0	0.0006569	0.0008772	0
median	0	0.0000020	0.0000033	0
mean	0	0.0000253	0.0000397	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

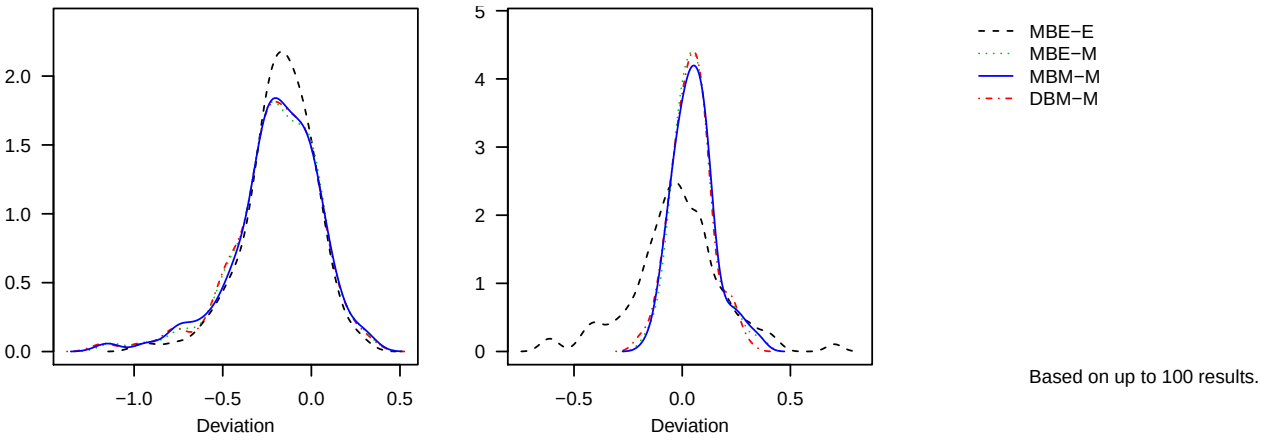
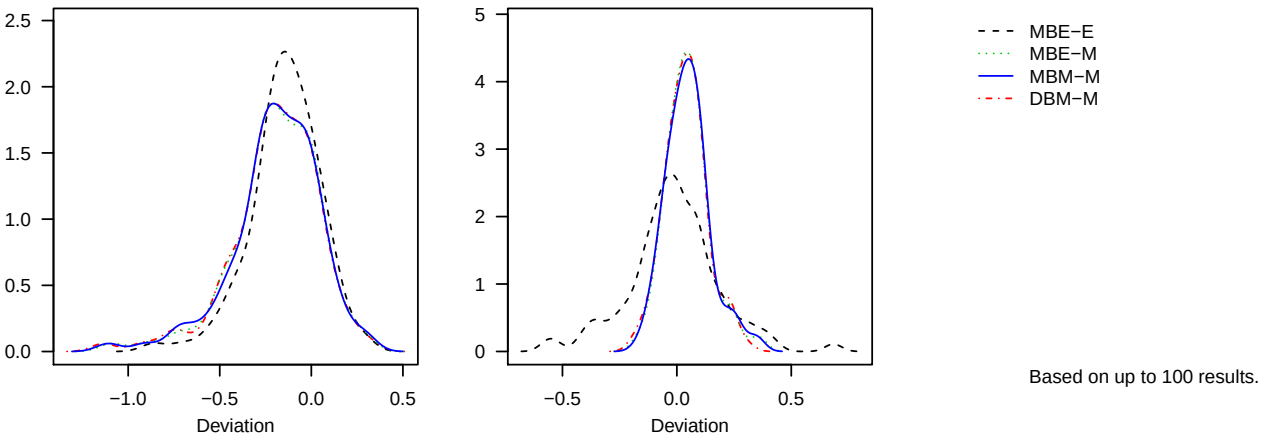


Table 27: RMSE

	alpha	sigma2
MBE-E	0.266	0.211
MBE-M	0.311	0.109
MBM-M	0.315	0.112
DBM-M	0.318	0.101

Posterior median

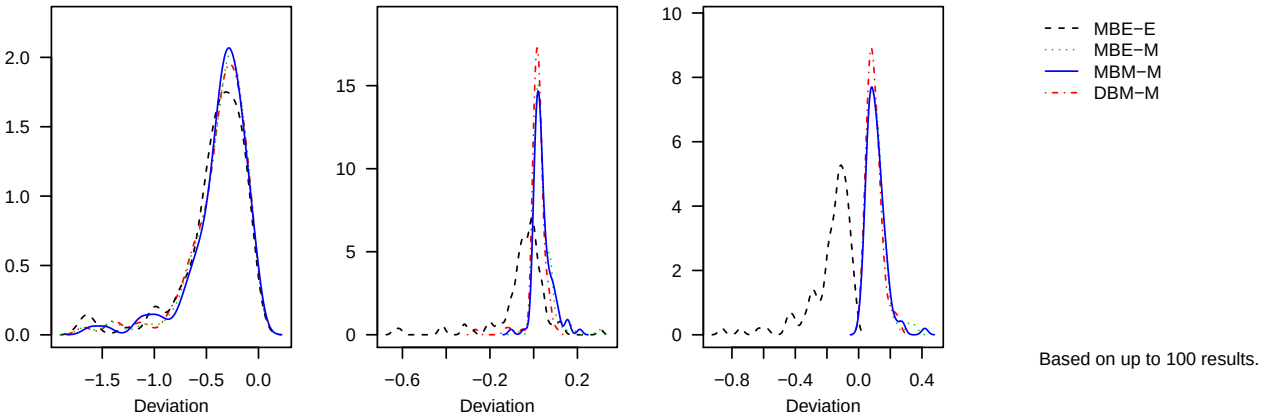


Based on up to 100 results.

Table 28: RMSE

	alpha	sigma2
MBE-E	0.238	0.198
MBE-M	0.302	0.106
MBM-M	0.305	0.107
DBM-M	0.308	0.099

Posterior variance and covariance



Based on up to 100 results.

Table 29: RMSE

	alpha	sigma2	covariance
MBE-E	0.526	0.141	0.232
MBE-M	0.476	0.057	0.123
MBM-M	0.470	0.057	0.124
DBM-M	0.485	0.044	0.108

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	8583614	217634	170827	33076
MBE-M	1816144	46540	24090	9090
MBM-M	300870	8498	6881	1437
DBM-M	1754024	174342	28089	8703

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.842	0.031	0.442	0.006
MBE-M	0.799	0.040	0.417	0.012
MBM-M	1.000	0.000	0.417	0.012
DBM-M	0.839	0.034	0.417	0.011

m = 5

`mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0`

`total # of negative proposals:`

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
0	91	40	0

`ratio of negative proposals and number of iterations:`

	DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
min	0	0.0e+00	0.00e+00	0
max	0	3.7e-06	2.44e-05	0
median	0	0.0e+00	0.00e+00	0
mean	0	1.0e-07	4.00e-07	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

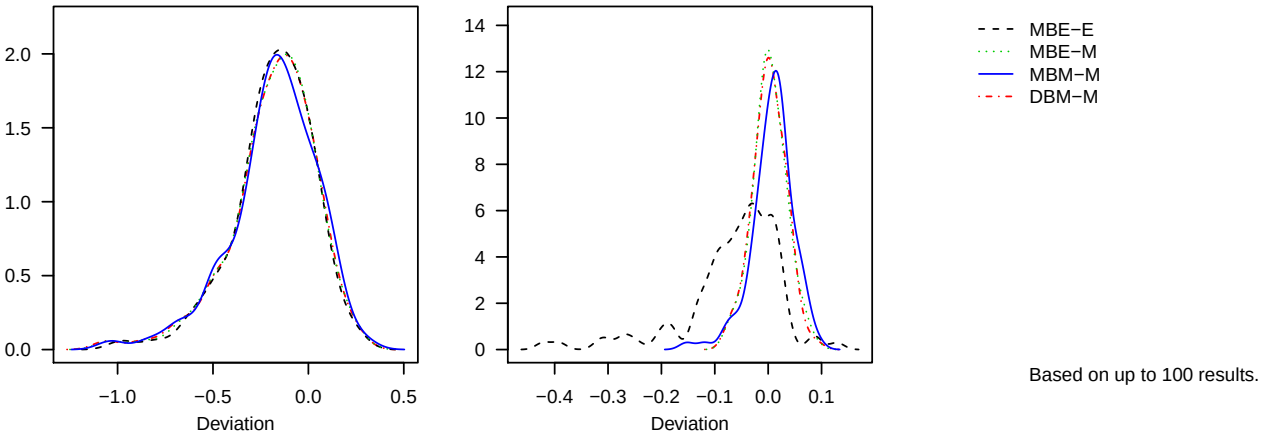


Table 34: RMSE

	alpha	sigma2
MBE-E	0.277	0.113
MBE-M	0.288	0.031
MBM-M	0.292	0.040
DBM-M	0.291	0.031

Posterior median

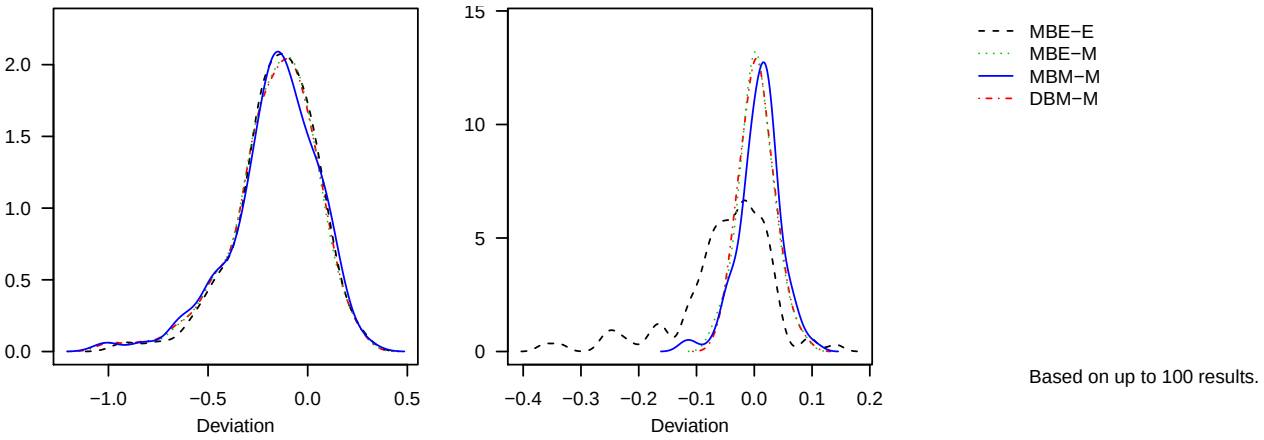


Table 35: RMSE

	alpha	sigma2
MBE-E	0.254	0.098
MBE-M	0.274	0.031
MBM-M	0.278	0.037
DBM-M	0.275	0.030

Posterior variance and covariance

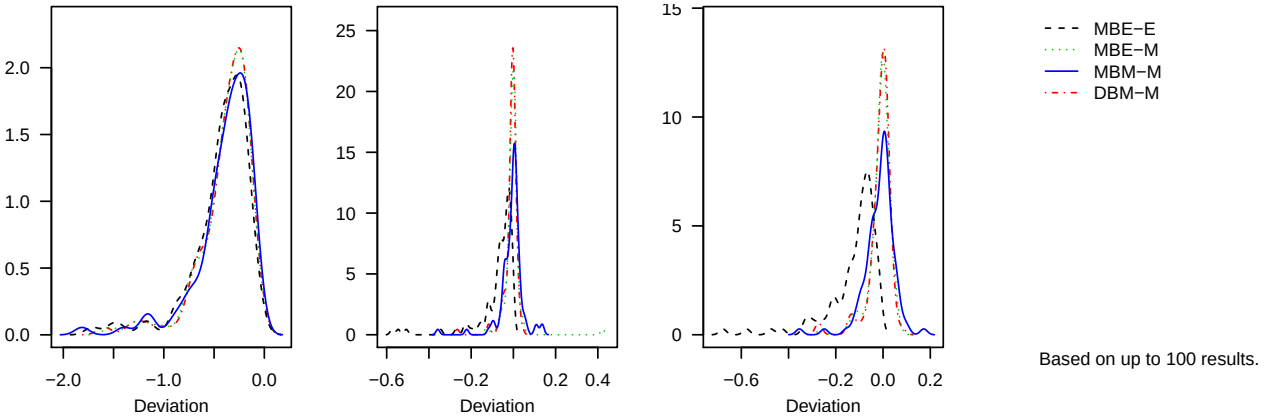


Table 36: RMSE

	alpha	sigma2	covariance
MBE-E	0.524	0.127	0.170
MBE-M	0.474	0.050	0.049
MBM-M	0.492	0.058	0.067
DBM-M	0.472	0.037	0.055

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	6765054	702467	49885	8837
MBE-M	892487	22258	5033	1194
MBM-M	78215	2858	573	114
DBM-M	879227	25268	5535	1179

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.892	0.019	0.310	0.004
MBE-M	0.844	0.028	0.304	0.002
MBM-M	0.978	0.009	0.304	0.003
DBM-M	0.884	0.021	0.304	0.002

	ARpath mean	ARpath sd	ARparam mean	ARparam sd

M = 50

m = 1

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

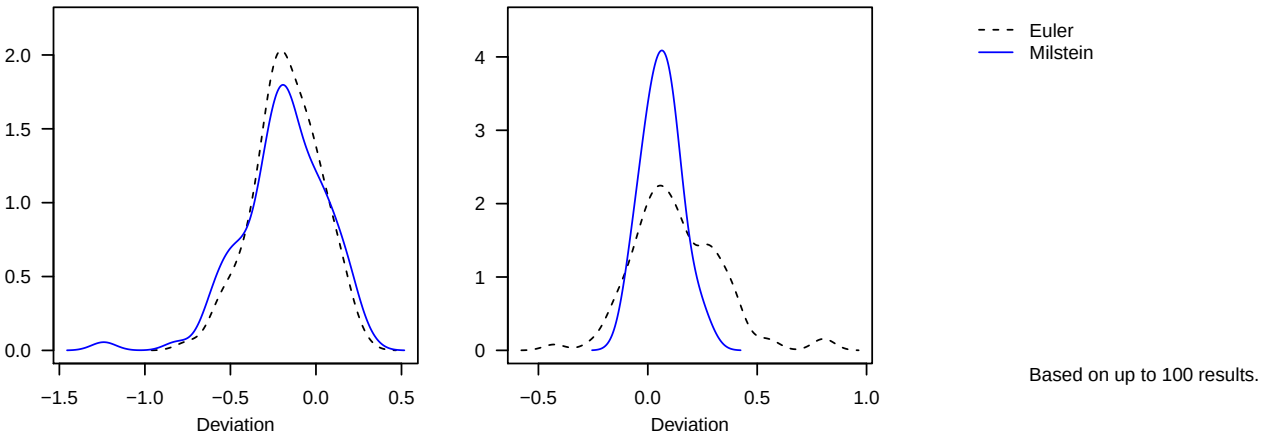


Table 39: RMSE

	alpha	sigma2
Euler	0.259	0.240
Milstein	0.313	0.105

Posterior median

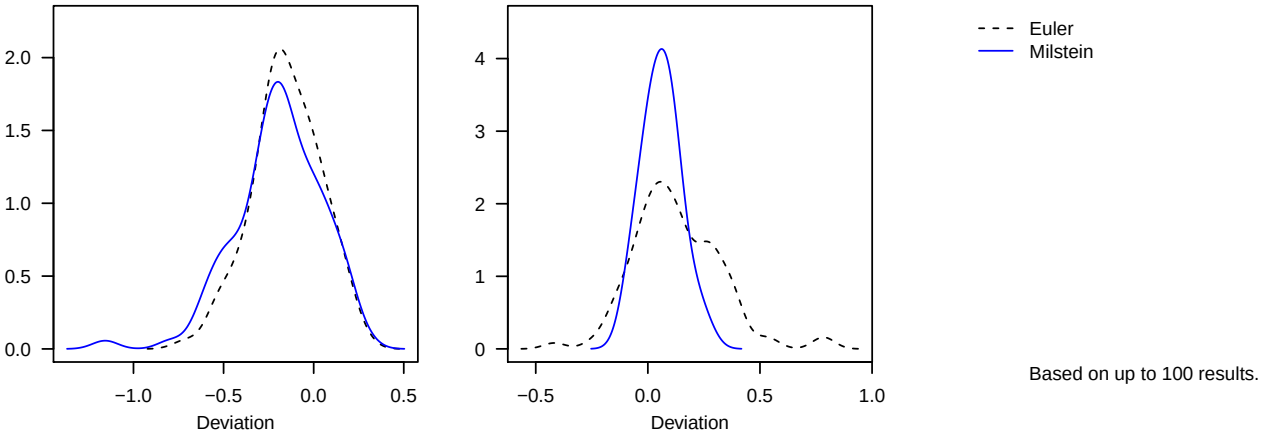


Table 40: RMSE

	alpha	sigma2
Euler	0.244	0.234
Milstein	0.310	0.102

Posterior variance and covariance

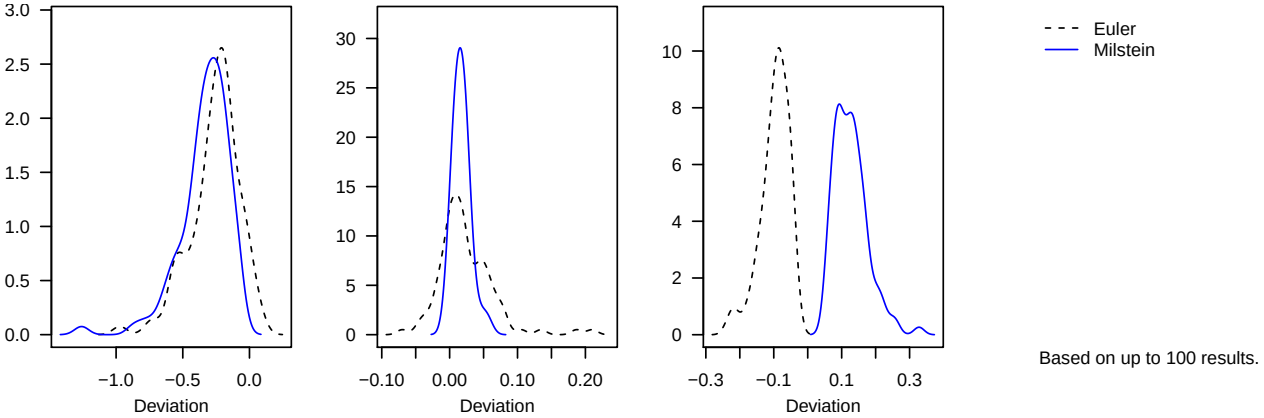


Table 41: RMSE

	alpha	sigma2	covariance
Euler	0.319	0.048	0.106
Milstein	0.384	0.021	0.136

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
Euler	23195646	619312	1156494	108760
Milstein	2011421	51685	94538	10482

Acceptance rates

	ARparam mean	ARparam sd
td_E	0.398	0.003
td_M	0.381	0.003

m = 2

```
mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0

total # of negative proposals:
```

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
0	0	0	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

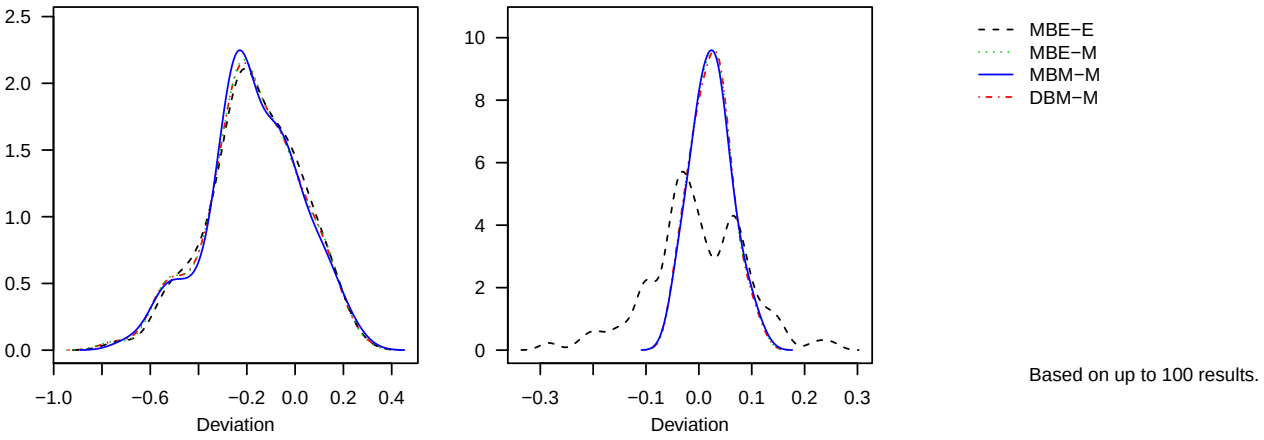


Table 45: RMSE

	alpha	sigma2
MBE-E	0.253	0.091
MBE-M	0.259	0.044
MBM-M	0.257	0.045
DBM-M	0.260	0.044

Posterior median

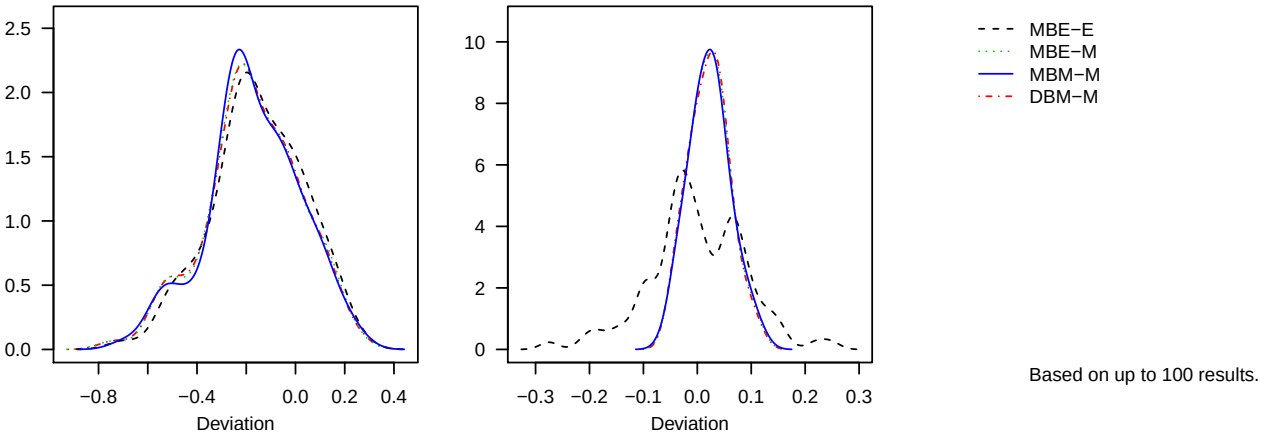


Table 46: RMSE

	alpha	sigma2
MBE-E	0.242	0.089
MBE-M	0.258	0.043
MBM-M	0.255	0.044
DBM-M	0.258	0.043

Posterior variance and covariance

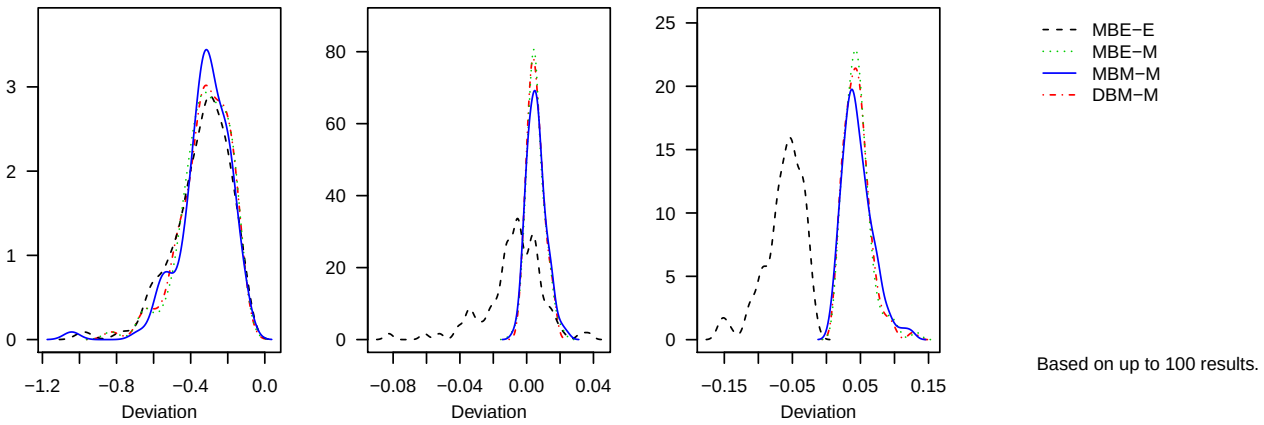


Table 47: RMSE

	alpha	sigma2	covariance
MBE-E	0.373	0.019	0.069
MBE-M	0.346	0.007	0.049
MBM-M	0.350	0.008	0.051
DBM-M	0.348	0.007	0.049

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	7891530	455705	100013	12768
MBE-M	888981	32717	9416	1637
MBM-M	250083	7199	3972	484
DBM-M	871113	31979	10625	1717

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.898	0.011	0.320	0.002
MBE-M	0.872	0.014	0.313	0.001
MBM-M	1.000	0.000	0.313	0.001
DBM-M	0.899	0.011	0.313	0.001

m = 5

```
mean of # of switching to Euler for MB_td_Milstein_pd_Milstein: 0

total # of negative proposals:
```

DBM_td_M_pd_M	MB_td_E_pd_E	MB_td_M_pd_E	MB_td_M_pd_M
0	0	0	0

The following sections show density plots of the discrepancy between the respective statistic of the samples from the approximated posteriors (sampled with two-step MCMC) and the sample from the true posterior (sampled with Stan) calculated for the 100 simulated datasets.

Posterior mean

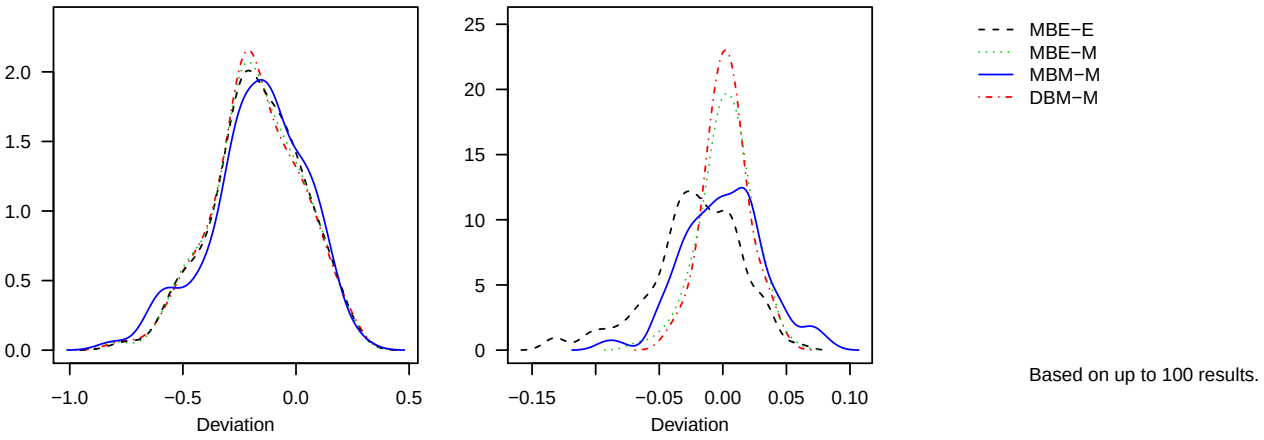


Table 51: RMSE

	alpha	sigma2
MBE-E	0.258	0.042
MBE-M	0.262	0.021
MBM-M	0.269	0.032
DBM-M	0.263	0.017

Posterior median

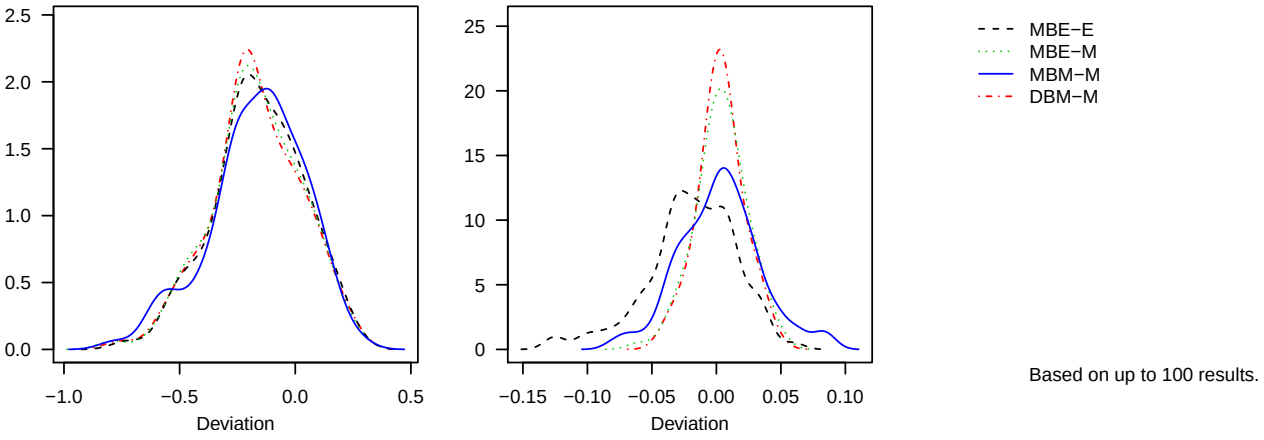


Table 52: RMSE

	alpha	sigma2
MBE-E	0.249	0.040
MBE-M	0.258	0.020
MBM-M	0.261	0.032
DBM-M	0.258	0.018

Posterior variance and covariance

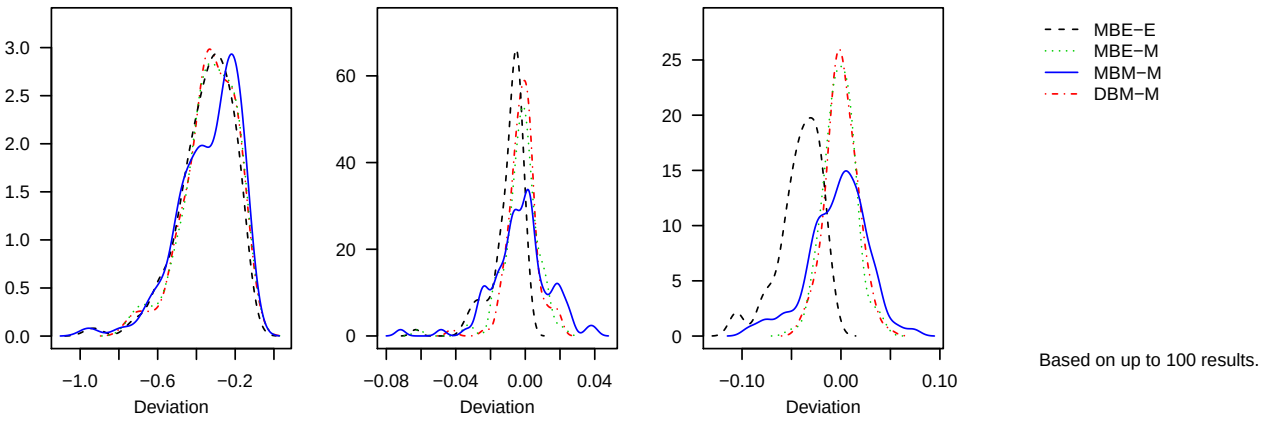


Table 53: RMSE

	alpha	sigma2	covariance
MBE-E	0.375	0.014	0.047
MBE-M	0.355	0.011	0.016
MBM-M	0.368	0.017	0.030
DBM-M	0.354	0.009	0.016

Number of iterations and effective sample size

	numIterations mean	numIterations sd	multivarESS mean	multivarESS sd
MBE-E	5988019	188045	23951	2435
MBE-M	396953	11399	1388	190
MBM-M	69078	1868	285	47
DBM-M	393650	9266	1469	196

Acceptance rates

	ARpath mean	ARpath sd	ARparam mean	ARparam sd
MBE-E	0.930	0.007	0.210	0.002
MBE-M	0.899	0.010	0.208	0.001
MBM-M	0.993	0.002	0.208	0.002
DBM-M	0.926	0.008	0.208	0.001

of missing results: 0

Stan results (sampling from and optimizing the true posterior)

M = 10

of missing results: 0

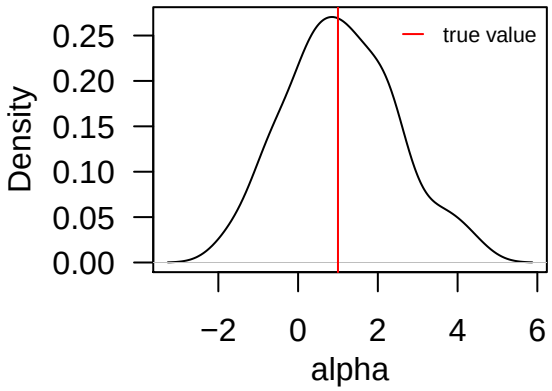
Rhat > 1.01: 0 (out of 200)

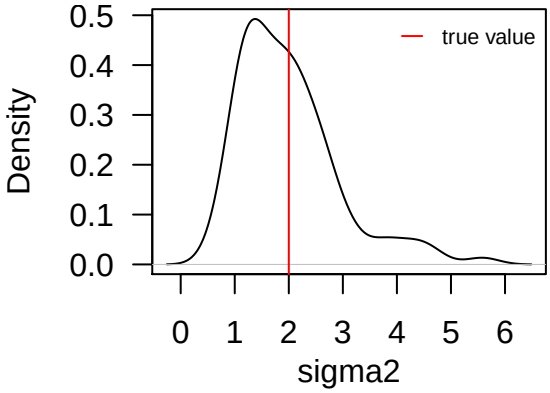
range of max. duration in seconds: (15.6, 17.2), median: 16.1

median multivarESS: 4.89745×10^5

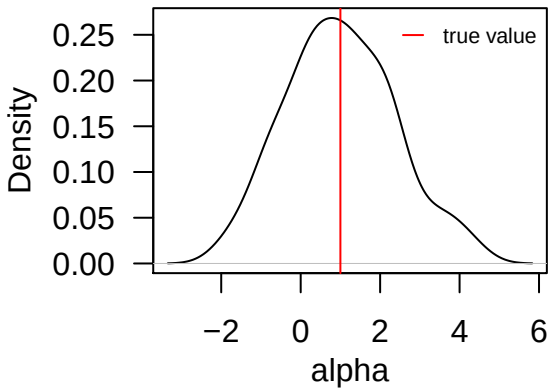
The following sections show density plots of the respective statistic calculated for the 100 simulated datasets.

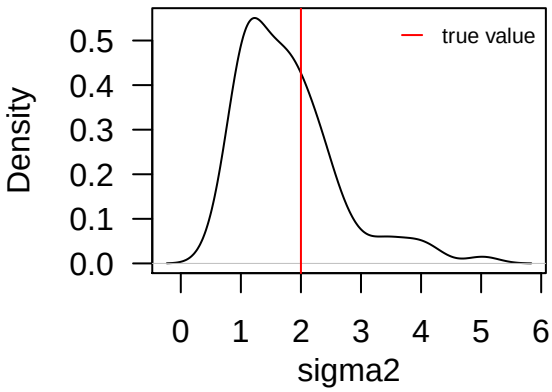
Posterior mean



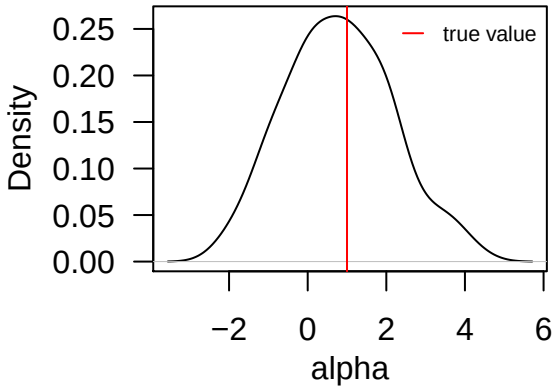


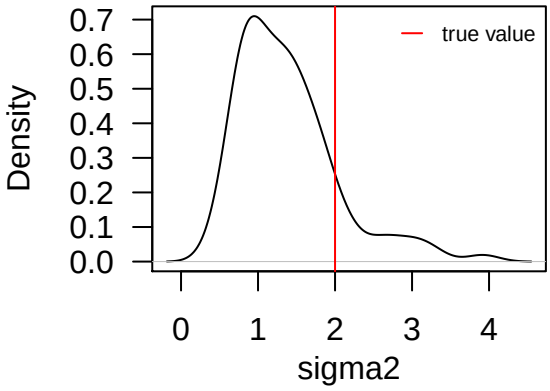
Posterior median



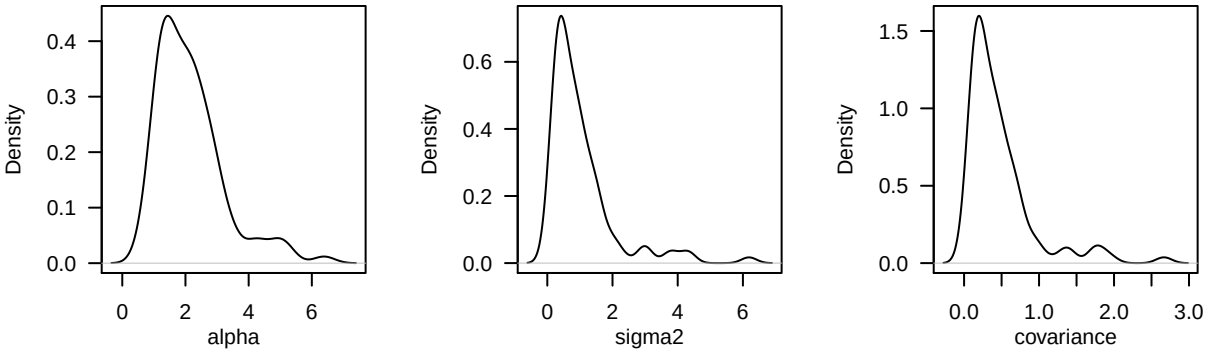


Optimized value

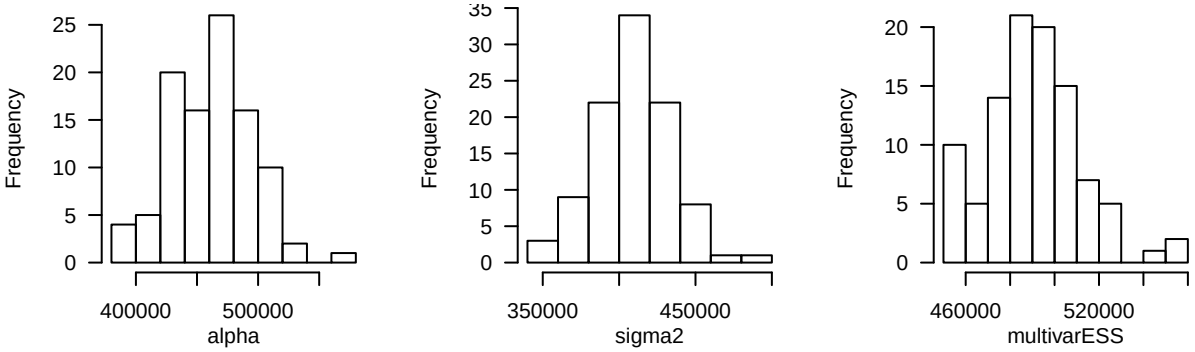




Posterior variance and covariance



Effective sample size



M = 20

of missing results: 0

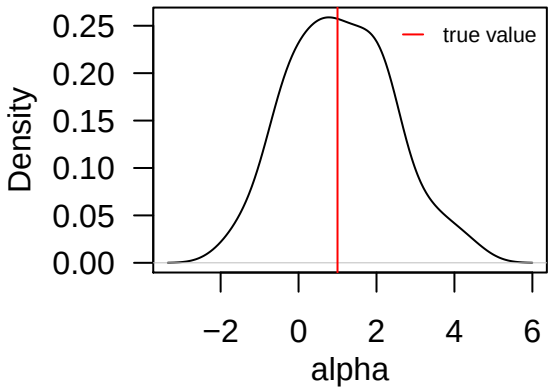
Rhat > 1.01: 0 (out of 200)

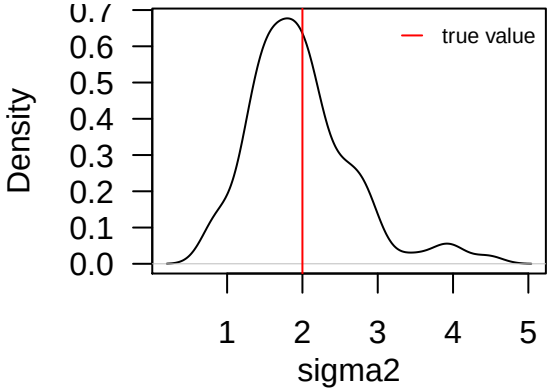
range of max. duration in seconds: (17.1, 19.9), median: 17.7

median multivarESS: 6.0174×10^5

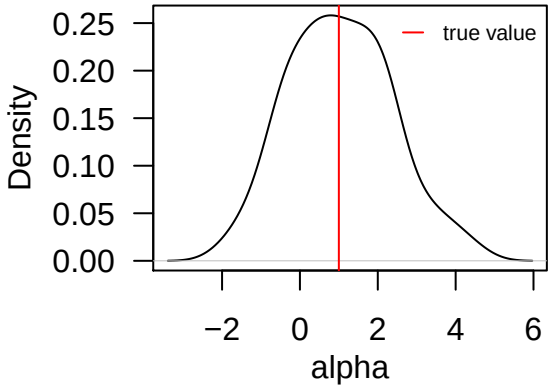
The following sections show density plots of the respective statistic calculated for the 100 simulated datasets.

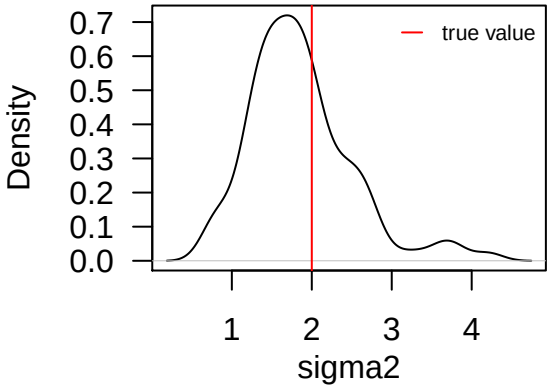
Posterior mean



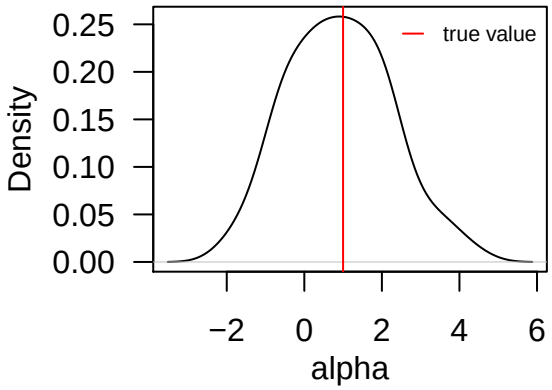


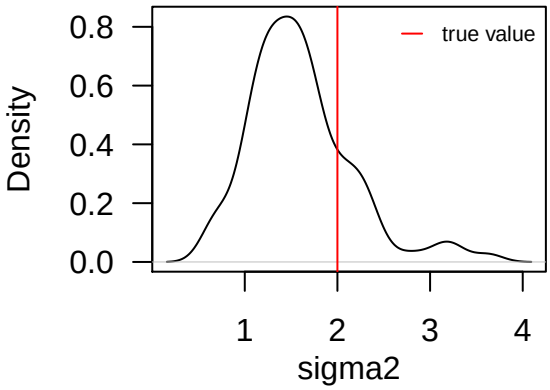
Posterior median



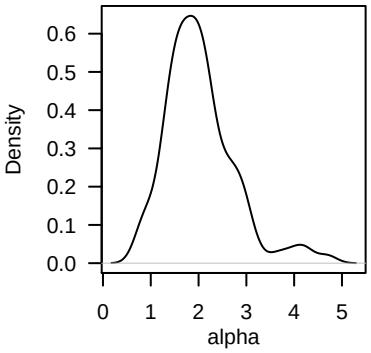


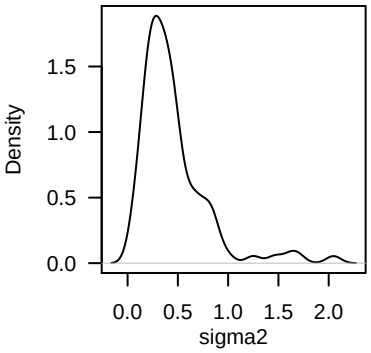
Optimized value

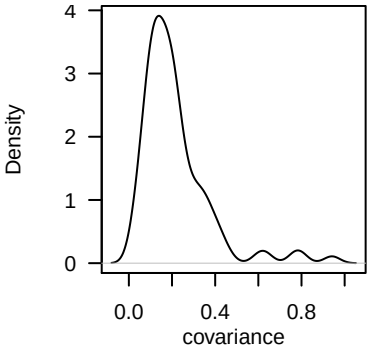




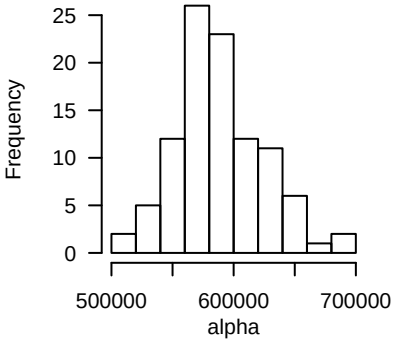
Posterior variance and covariance

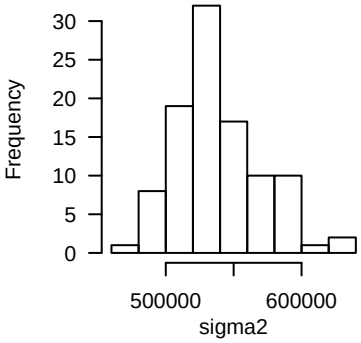


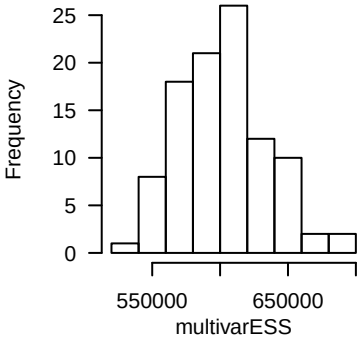




Effective sample size







M = 50

of missing results: 0

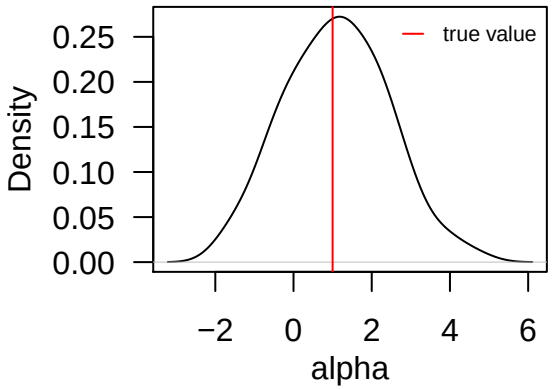
Rhat > 1.01: 0 (out of 200)

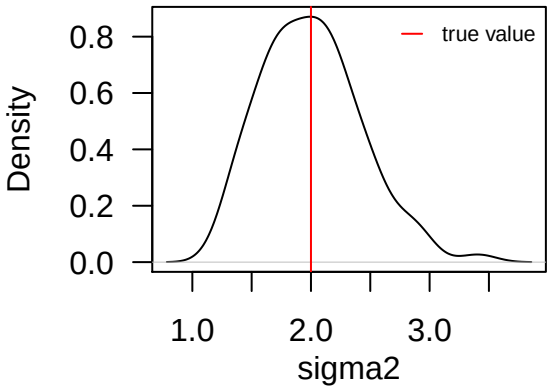
range of max. duration in seconds: (20.3, 26.1), median: 23.7

median multivarESS: 7.1865×10^5

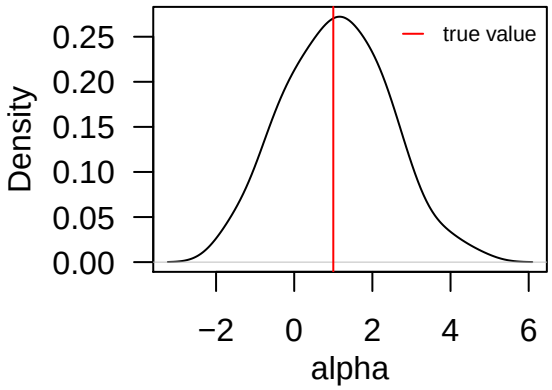
The following sections show density plots of the respective statistic calculated for the 100 simulated datasets.

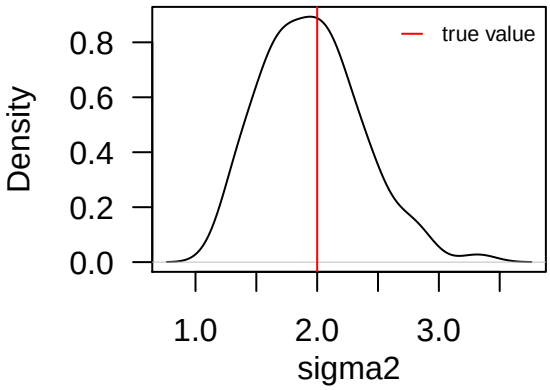
Posterior mean



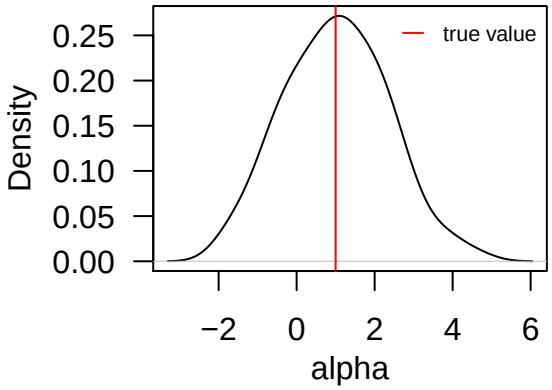


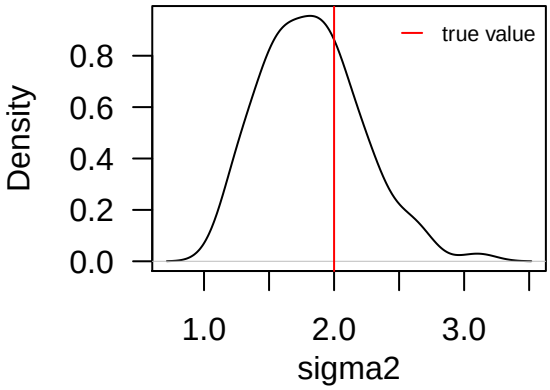
Posterior median



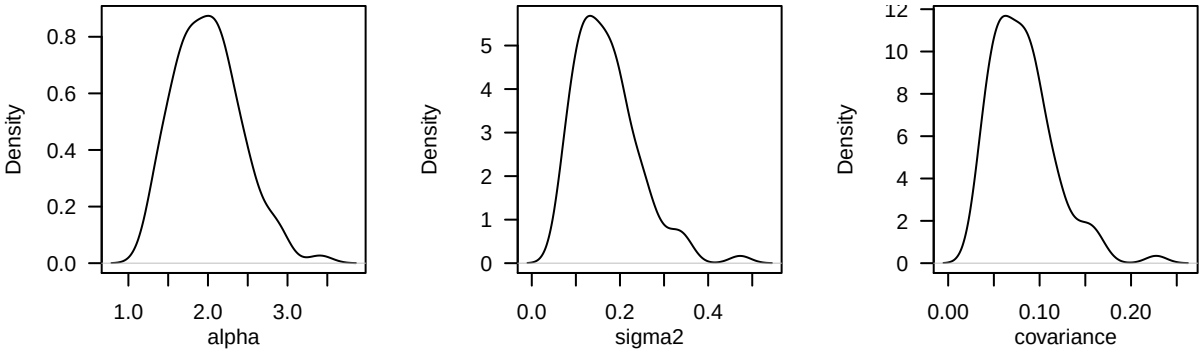


Optimized value

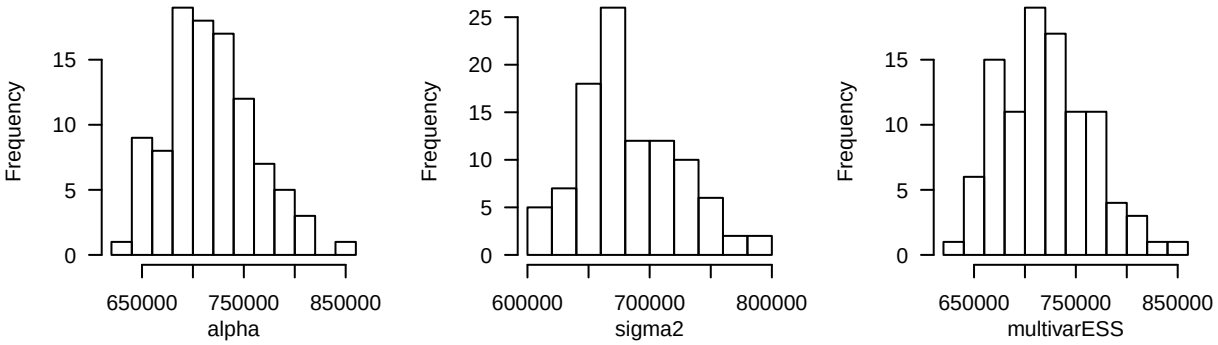




Posterior variance and covariance



Effective sample size



of missing Stan results: 0