

*S.M. Iacus*. Errata Corrige to the first edition of:

Iacus, S.M. (2008) *Simulation and Inference for Stochastic Differential Equations: with R examples*, Springer Series in Statistics, Springer NY, ISBN: 978-0-387-75838-1.

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## Errata in Chapter 1

Where	Errata	Corrige
p:14, l:-22	$(\omega, \mathcal{A}, P)$	$(\Omega, \mathcal{A}, P)$
p:18, l:2	$(\omega, \mathcal{A}, P)$	$(\Omega, \mathcal{A}, P)$
p:30, l:-2	$\Pi_n \rightarrow 0$	$  \Pi_n   \rightarrow 0$
p:36, l:-3	$t \rightarrow -\infty$	$t \rightarrow \infty$
p:39, l:3	$O(dt)$	$o(dt)$
p.39, f. (1.30)	$\left(b_1(s) - \frac{1}{2}\sigma_1(s)\right)$	$\left(b_1(s) - \frac{1}{2}\sigma_1^2(s)\right)$
p.42, l:11	$b_1(x) = \nu$	$b_1(x) = 0$
p.42, l:12	$b_2(x) = 0$	$b_2(x) = \nu$

p.42, central formula becomes

$$\begin{aligned}
 \frac{dP_2}{dP_1}(Y) &= \exp \left\{ \int_0^1 \frac{\nu - 0}{\sigma^2} dY_s - \frac{1}{2} \int_0^1 \frac{\nu^2 - 0^2}{\sigma^2} dt \right\} \\
 &= \exp \left\{ \frac{\nu}{\sigma^2} \int_0^1 (\nu ds + \sigma dW_s) - \frac{1}{2} \frac{\nu^2}{\sigma^2} \right\} \\
 &= \exp \left\{ \left( \frac{\nu}{\sigma} \right)^2 + \frac{\nu}{\sigma} W_1 - \frac{1}{2} \frac{\nu^2}{\sigma^2} \right\} \\
 &= \exp \left\{ \frac{1}{2} \left( \frac{\nu}{\sigma} \right)^2 + \frac{\nu W_1}{\sigma} \right\} .
 \end{aligned}$$

p.42, script `ex1.14.R` has changed to match this errata corrige in version 2.0.7 of the `sde` package. See below:

```
# ex1.14.R -- corrected version. See errata corrige to the first edition
set.seed(123)
par("mar"=c(3,2,1,1))
par(mfrow=c(2,1))
npaths <- 30
N <- 1000
sigma <- 0.5
nu <- -0.7
X <- sde.sim(drift=expression(0),sigma=expression(0.5), pred=F, N=N,M=npaths)
```

```

Y <- X + nu*time(X)
girsanov <- exp(0.25 * (nu/sigma*X[N,] + 0.5*(nu/sigma)^2))
girsanov <- (girsanov - min(girsanov)) / diff(range(girsanov))
col.girsanov <- gray(1-girsanov)
matplot(time(X),Y,type="l",lty=1, col="black",xlab="t")
matplot(time(X),Y,type="l",lty=1,col=col.girsanov,xlab="t")

```

## Errata in Chapter 3

Where	Errata	Corrige
p:175, l:7	$f(y, x)$	$f(x, y)$
p:176, l:10	$f(y, x)$	$f(x, y)$
p:177, l:9	$f(y, x)$	$f(x, y)$

The following code for `dcKessler` had a missing square in term `Ex` in the definition of `Vx`.

```

dcKessler <- function (x, t, x0, t0, theta, d, dx, dxx, s, sx, sxx, log = FALSE){
  Dt <- t - t0
  mu <- d(t0, x0, theta)
  mu1 <- dx(t0, x0, theta)
  mu2 <- dxx(t0, x0, theta)
  sg <- s(t0, x0, theta)
  sg1 <- sx(t0, x0, theta)
  sg2 <- sxx(t0, x0, theta)
  Ex <- (x0 + mu * Dt + (mu * mu1 + 0.5 * (sg^2 * mu2)) * (Dt^2)/2)
  Vx <- (x0^2 + (2 * mu * x0 + sg^2) * Dt + (2 * mu * (mu1 *
    x0 + mu + sg * sg1) + sg^2 * (mu2 * x0 + 2 * mu1 + sg1^2 +
    sg * sg2)) * (Dt^2)/2 - Ex^2)
  Vx[Vx < 0] <- NA
  dnorm(x, mean = Ex, sd = sqrt(Vx), log = log)
}

```

## Errata in Chapter 4

p:213-214, Listing 4.3. The `cpoint` function has been fixed as follows in version 2.0.5 of the `sde` package. See below.

```

function (x, mu, sigma)
{
  DELTA <- deltat(x)
  n <- length(x)
  Z <- NULL
  if (!missing(mu) && !missing(sigma)) {
    Z <- (diff(x) - mu[x[1:(n - 1)]] * DELTA)/(sqrt(DELTA) *
      sigma[x[1:(n - 1)]])
  }
  else {
    bw <- n^(-1/5) * sd(x)
    y <- sapply(x[1:(n - 1)], function(xval) {
      tmp <- dnorm(xval, x[1:(n - 1)], bw)
      sum(tmp * diff(x))/(DELTA * sum(tmp))
    })
    Z <- diff(x)/sqrt(DELTA) - y * sqrt(DELTA)
  }
}

```

```

lenZ <- length(Z)
Sn <- cumsum(Z^2)
S <- sum(Z^2)
D <- abs(1:lenZ/lenZ - Sn/S)
k0 <- which(D == max(D))[1]
return(list(k0 = k0 + 1, tau0 = time(x)[k0 + 1], theta1 = sqrt(Sn[k0]/k0),
           theta2 = sqrt((S - Sn[k0])/(lenZ - k0))))
}

```

## Updated references

27. Beskos, A., Papaspiliopoulos, O., Roberts, G.O. (2006) Retrospective exact simulation of diffusion sample paths with applications, *Bernoulli*, **12**(6), 1077–1098.
28. Beskos, A., Papaspiliopoulos, O., Roberts, G.O. (2008) A Factorisation of Diffusion Measure and Finite Sample Path Constructions, *Meth. Compt. App. Prob.*, **10**(1), 85-104.
64. De Gregorio, A., Iacus, S.M. (2008) Least squares volatility change point estimation for partially observed diffusion processes, *Communications in Statistics, Theory and Methods*, **37**(15), 2342–2357.
157. Lepage, T., Law, S., Tupper, P., Bryant, D. (2006) Continuous and tractable models for the variation of evolutionary rates, *Math. Biosciences*, **199**(2), 216–233.

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