Errata

(Updated Oct 2017)

Monte Carlo Methods for Particle Transport, Alireza Haghighat, CRC Press, Dec 2014 (K20567)

Page	item	For	Read
Pg. xvii	Line 4	"White Oak"	"University Park"
Pg. 15	Eq. 2.7	$q = (\eta) = 1$	$q(\eta) = 1$
Pg. 16	Eq. 2.12	$Q(\eta) =$	$q(\eta) =$
Pg. 16	Eq. 2.13	$q(\eta) =$	$Q(\eta) =$
Pg. 21	Line 1	If exact computation of ~~p(x), i.e., pdf, is~~ straightforward,	If exact computation of $P^{-1}(\eta)$ is not straightforward,
Pg. 22	Eq. 2.29	$P_i = \sum_{i'=1}^{i'} p'_i (x_{i'} - x_{i'-1})$	$P_i = \sum_{i'=1}^{i} p_{i'} (x_{i'} - x_{i'-1})$
Pg. 31	Problem 5, part a.	$f(x) = 1 + x - x^3$	$f(x) = 1 + x + x^3$
Pg. 33	Problem 15, line 1	Write an algorithm for sampling ~~x from~~ *sin(x)*	Write an algorithm for sampling *sin(x)*
Pg. 40	Fig. 3.2, caption	(a) uses multipliers 5, 9, and 13 and (b) uses multiplier 14.	(a) uses multipliers 9 (solid) and 13 (dotted), and (b) uses multiplier 7 (solid) and 14 (dotted)
Pg. 42	Fig. 3.3, caption	(a) Odd constant; (b) even constant	(a) Odd contacts of 3 (solid) and 5 (dotted); (b) even constants of 6 (solid) and 8 (dotted)
Pg. 44	Fig. 3.5, caption	Random number generators for multipliers 3 and 11.	Random number generators for multipliers 3 (solid) and 11 (dotted)
Pg. 46	Table 3.6	Remove the first row, i.e., $\cancel{x_k = x_{k-17} - x_{k-5}}$ $\cancel{(2^{17} - 1)x2^{24} = 2.2\,x}\ 10^{12}$	
Pg. 47	Eq. (3.8)	$\chi^2 = \sum_{i}^{n} \frac{(N_i - Np_i)^2}{Np_i}$	$\chi^2 = \sum_{i=1}^{n} \frac{(N_i - Np_i)^2}{Np_i}$
Pg. 52	Table 3.11, First row, 8th column	50%	25%
Pg. 52	Line 5	Indicates that the ~~seed~~ can significantly	Indicates that the constant can significantly
Pg. 52	Last Line	12, 14, and 16	18, 20, and 22
Pg. 52	Table 3.12, First row, 2nd column	11	17
Pg. 53	Line 1	"25% periods."	"partial periods."
Pg. 53	Line 10	"Table 3.14"	"Table 3.12"

Pg. 53	Line 12	“Case 11”	“Case 17”
Pg. 53	Line 13	“Case 12”	“Case 18”
Pg. 53	Line 14	“Case 11”	“Case 17”
Pg. 53	Line 19	“Cases 11 and 18”	“Cases 17 and 18”
Pg. 53	Line 21	“(Case 11 especially)”	“(Case 17 especially)”
Pg. 53	Fig. 3.6, caption	“(a) Case 11”	“(a) Case 17”
Pg. 54	Fig. 3.6, caption	“(a) Case 11”	“(a) Case 17”
Pg. 54	Line 1	“Case 20”	“Case 23”
Pg. 54	Line 2	“Cases 1 and 2”	“Cases 17 and 18”
Pg. 54	Fig. 3.7, caption	“Case 20”	“Case 23”
Pg. 66	Line 3	“Equation (4.20)”	“Equation (4.23)”
Pg. 66	Line 5	“Equation (4.21)”	“Equation (4.15)”
Pg. 74	Line 9	$\ln P(n) = \cdots$	$\ln p(n) = \cdots$
Pg. 74	Line 10	“$P(n)$”	“$p(n)$”
Pg. 75	Eq. (4.51)	For:	$\ln\big(P(n)\big) = \ln\big(P(\tilde{n})\big) + \frac{1}{2!}\left[\frac{d^2(\ln(P(n))}{dn^2}\right]_{\tilde{n}} (n-\tilde{n})^2$
		Read:	$\ln\big(p(n)\big) = \ln\big(p(\tilde{n})\big) + \frac{1}{2!}\left[\frac{d^2\big(\ln(p(n))\big)}{dn^2}\right]_{\tilde{n}} (n-\tilde{n})^2$
Pg. 76	Eq. (4.55)	$\sum_n P(n) = 1$	$\sum_n p(n) = 1$
Pg. 76	Eq. (4.59)	$P(n) = \cdots$	$p(n) = \cdots$
Pg. 81	Line -4	$\Pr[\lvert p' - p\rvert < \ ] = ?$	$\Pr[\lvert p' - p\rvert < \varepsilon] = ?$
Pg. 81	Eq. (4.67)	$\Pr\left[\left\lvert\frac{x}{n} - p\right\rvert < \ \right] = ?$	$\Pr\left[\left\lvert\frac{x}{n} - p\right\rvert < \varepsilon\right] = ?$
Pg. 82	Eq. (4.68)	$\left\lvert\frac{x}{n} - p\right\rvert <$	$\left\lvert\frac{x}{n} - p\right\rvert < \varepsilon$
Pg. 82	Eq. (4.69)	$\left\lvert\frac{x-np}{\sqrt{npq}}\right\rvert < \sqrt{\frac{n}{pq}}$	$\left\lvert\frac{x-np}{\sqrt{npq}}\right\rvert < \sqrt{\frac{n}{pq}}\varepsilon$
Pg. 82	Line 6	For:	$-\sqrt{\frac{n}{pq}} \leq \frac{x-np}{\sqrt{npq}} \leq \sqrt{\frac{n}{pq}}$
		Read:	$-\sqrt{\frac{n}{pq}}\varepsilon \leq \frac{x-np}{\sqrt{npq}} \leq \sqrt{\frac{n}{pq}}\varepsilon$

Pg. 82	Eq. (4.70)	For:	$\Pr\left[\left\vert\frac{x-np}{\sqrt{npq}}\right\vert \le \sqrt{\frac{n}{pq}}\ \right] = \Phi\left(\sqrt{\frac{n}{pq}}\ \right) - \Phi\left(-\sqrt{\frac{n}{pq}}\ \right)$
		Read:	$\Pr\left[\left\vert\frac{x-np}{\sqrt{npq}}\right\vert \le \sqrt{\frac{n}{pq}}\,\varepsilon\right] = \Phi\left(\sqrt{\frac{n}{pq}}\,\varepsilon\right) - \Phi\left(-\sqrt{\frac{n}{pq}}\,\varepsilon\right)$
Pg. 82	Line -10	For:	$\Phi\left(-\sqrt{\frac{n}{pq}}\ \right) = 1 - \Phi\left(\sqrt{\frac{n}{pq}}\ \right)$
		Read:	$\Phi\left(-\sqrt{\frac{n}{pq}}\,\varepsilon\right) = 1 - \Phi\left(\sqrt{\frac{n}{pq}}\,\varepsilon\right)$
Pg. 82	Eq. (4.71)	For:	$\Pr\left[\left\vert\frac{x-np}{\sqrt{npq}}\right\vert \le \sqrt{\frac{n}{pq}}\ \right] = 2\Phi\left(\sqrt{\frac{n}{pq}}\ \right) - 1$
		Read:	$\Pr\left[\left\vert\frac{x-np}{\sqrt{npq}}\right\vert \le \sqrt{\frac{n}{pq}}\,\varepsilon\right] = 2\Phi\left(\sqrt{\frac{n}{pq}}\,\varepsilon\right) - 1$
Pg. 82	Eq. (4.72)	$\left\vert\frac{\frac{x}{n}-p}{p}\right\vert <$	$\left\vert\frac{\frac{x}{n}-p}{p}\right\vert < \varepsilon$
Pg. 83	Line 3	$\left\vert\frac{x-np}{\sqrt{npq}}\right\vert < \sqrt{\frac{n}{pq}}$	$\left\vert\frac{x-np}{\sqrt{npq}}\right\vert < \sqrt{\frac{n}{pq}}\,\varepsilon$
Pg. 83	Line 3	$\left\vert\frac{x-np}{\sqrt{npq}}\right\vert < \sqrt{\frac{n}{pq}}\,\varepsilon$	$\left\vert\frac{x-np}{\sqrt{npq}}\right\vert < \sqrt{\frac{pn}{q}}\,\varepsilon$
Pg. 83	Eq. (4.73)	For:	$\Pr\left[\left\vert\frac{x-np}{\sqrt{npq}}\right\vert \le \sqrt{\frac{n}{pq}}\ \right] = 2\Phi\left(\sqrt{\frac{n}{pq}}\ \right) - 1$
		Read:	$\Pr\left[\left\vert\frac{x-np}{\sqrt{npq}}\right\vert \le \sqrt{\frac{n}{pq}}\,\varepsilon\right] = 2\Phi\left(\sqrt{\frac{n}{pq}}\,\varepsilon\right) - 1$
Pg. 83	Eq. (4.73)	For:	$\Pr\left[\left\vert\frac{x-np}{\sqrt{npq}}\right\vert \le \sqrt{\frac{n}{pq}}\,\varepsilon\right] = 2\Phi\left(\sqrt{\frac{n}{pq}}\,\varepsilon\right) - 1$
		Read:	$\Pr\left[\left\vert\frac{x-np}{\sqrt{npq}}\right\vert \le \sqrt{\frac{np}{q}}\,\varepsilon\right] = 2\Phi\left(\sqrt{\frac{np}{q}}\,\varepsilon\right) - 1$

Pg. 85	Line 6	For:	$\text{pr}\equiv\Pr\left[\left\lvert\frac{x-np}{\sqrt{npq}}\right\rvert < \sqrt{\frac{np}{q}}\right]$
		Read:	$\text{pr}\equiv\Pr\left[\left\lvert\frac{x-np}{\sqrt{npq}}\right\rvert < \sqrt{\frac{np}{q}}\varepsilon\right]$
Pg. 85	Eq. 4.75	$n = \frac{q}{p}\left(\frac{1}{\varepsilon^2}\right)\phi^{-}$	$n = \frac{q}{p}\left(\frac{1}{\varepsilon^2}\right)\left[\phi^{-1}\left(\frac{1+pr}{2}\right)\right]^2$
Pg. 85	Fig. 4.9,caption	"(=1%)"	"(ε=1%)"
Pg. 88	Eq. 4.83 (first part of the equation)	For:	$R_{\bar{x}} = \frac{R_x}{n} =$
		Read:	$R_{\bar{x}} = \frac{R_x}{\sqrt{n}} =$
Pg. 90	Eq. (4.90)	For:	$m = E[t] = \int_{-\infty}^{\infty} tf_k(t) = 0$
		Read:	$m = E[t] = \int_{-\infty}^{\infty} dt\, tp_k(t) = 0$
Pg. 91	Eq. (4.93)	For:	$\lim_{k\to\infty}[f_k(t)] = \phi(t) = \frac{1}{\sqrt{2\pi}}e^{\frac{r^2}{2}}$
		Read:	$\lim_{k\to\infty}[p_k(t)] = \phi(t) = \frac{1}{\sqrt{2\pi}}e^{\frac{-t^2}{2}}$
Pg. 95	Problem 10, line 2	$\sum e^{-\Sigma r}$	$\Sigma e^{-\Sigma r}$
Pg. 96	Caption of Table 4.4	Probability table for Problem 7	Probability table for Problem 13
Pg. 96	Problem 15, line 2	$\Sigma = 2.0$	$\Sigma = 2.0\ cm^{-1}$
Pg. 96	Problem 15, line 4	$p(r) = \sum e^{-\Sigma r}$	$p(r) = \Sigma e^{-\Sigma r}$
Pg. 103	Eq. (5.18)	For:	$-\frac{g^2(x)f^2(x)}{f^2(x)} + \lambda = 0$
		Read:	$-\frac{g^2(x)f^2(x)}{f^{*2}(x)} + \lambda = 0$
Pg. 106	After Eq. 5.30, line 3	$Var[g(x)-h(x)] \ll Var[f(x)]$	$Var[g(x)-h(x)] \ll Var[g(x)]$
Pg. 114	Line 11	"per internal."	"per interval."
Pg. 122	Line 1	"birth to birth"	"birth to death"
Pg. 122	After Eq. 6.1, line 3	$\sum_t$ ■	Σ_t

Pg. 122	After Eq. 6.1, line 6	$\sum_s$ ■	Σ_s
Pg. 123	Eq. 6.2	For:	$\mu\frac{\partial\psi(x,\mu)}{\partial x}+\Sigma_t(x)\psi(x,\mu)=\frac{1}{2}\left(\Sigma_s\varphi(x)+\ S(x,\mu)\right)$
		Read:	$\mu\frac{\partial\psi(x,\mu)}{\partial x}+\Sigma_t\psi(x,\mu)=\frac{1}{2}\Sigma_s\phi(x)+\ s(x,\mu)$
Pg. 123	After Eq. 6.3, line 2	$\sum_t\ =\sum_s\ +\sum_a$	$\Sigma_t=\Sigma_s+\Sigma_a$
Pg. 124	Last line	$\sum_t dr$	$\Sigma_t dr$
Pg. 125	Eq. 6.6	$\sum_t dr$ $r=-\frac{-ln\eta}{\Sigma_t}$	$\Sigma_t dr$ $r=-\frac{-ln\eta}{\Sigma_t}$
Pg. 125	After Eq. 6.6, lined 4 & 6	$\sum_t$	Σ_t
Pg. 125	Eq. 6.7	$\mathrm{b}=\sum_t r\ =-ln\eta$	$\mathrm{b}=\Sigma_t r=\ -ln\eta$
Pg. 125	Eq. 6.8	$b_{m-1}\cancel{\leq}-ln\eta\cancel{<}b_m$ $\text{where,}\ b_m=\sum_{i=1}^{m}(\sum_{t,i}r_i)$	$b_{m-1}<-ln\eta\leq b_m$ $\text{where,}\ b_m=\sum_{i=1}^{m}\Sigma_{t,i}r_i$
Pg. 125	Eq. 6.9	$r=\frac{-ln\eta-b_{\cancel{m-1}}}{\Sigma_{t,i}}$	$r=\frac{-ln\eta-b_m}{\Sigma_{t,m}}$
Pg. 126	Lines 8 & 9	$\sum_a/\Sigma_t$	Σ_a/Σ_t
Pg. 127	Line -2	"solid angle theta,"	"solid angle,"
Pg. 130	Line 7	"and is expressed by"	"and $\widehat{\Omega}'$ is expressed by"
Pg. 134	Eq. 6.27	$\frac{R_1}{R_2}=\frac{(\sigma_x)_1}{(\sigma_x)_2}\sqrt{\frac{N_2}{N_1}}$	$\frac{R_1}{R_2}=\frac{\left(\frac{\sigma_x}{\bar{x}}\right)_1}{\left(\frac{\sigma_x}{\bar{x}}\right)_2}\sqrt{\frac{N_2}{N_1}}$
Pg. 134	After Eq. 6.27, line 2	$(\sigma_x)_1=(\sigma_x)_2$	$\left(\frac{\sigma_x}{\bar{x}}\right)_1=\left(\frac{\sigma_x}{\bar{x}}\right)_2$
Pg. 134	Eq. 6.29	$FOM=\frac{1}{R_{\bar{x}}^2T}=\frac{1}{\frac{\sigma_{\bar{x}}^2}{N}T}$	$FOM=\frac{1}{R_{\bar{x}}^2T}=\frac{1}{\frac{\sigma_{\bar{x}}^2}{\bar{x}N}T}$

Page	Location	For	Read
Pg. 134	After Eq. 6.29, line 1	σ_x	$\frac{\sigma_x}{\bar{x}}$
Pg. 135	Eq. 6.32	$\frac{FOM_1}{FOM_2} = \frac{(\sigma_{\bar{x}}^2)_2}{(\sigma_{\bar{x}}^2)_1}\frac{T_2}{T_1}$	$\frac{FOM_1}{FOM_2} = \left(\frac{R_{\bar{x},2}}{R_{\bar{x},1}}\right)^2\frac{T_2}{T_1}$
Pg. 135	Eq. 6.33	$T_2 = \frac{(\sigma_{\bar{x}}^2)_1}{(\sigma_{\bar{x}}^2)_2}T_1$	$T_2 = \left(\frac{R_{\bar{x},1}}{R_{\bar{x},2}}\right)^2 T_1$
Pg. 137	Problem 5, line 2	For the following ~~a~~ 3-region shield	For the following 3-region shield
Pg. 139	Line 1	"Chapter 4"	"Chapter 6"
Pg. 141	Title of Section 7.3	Biasing of density function	Biasing of probability density function
Pg. 143	Eq. (7.12)	For:	biased pdf $= (\Sigma_t - c\mu)e^{-(\Sigma_t - c\mu)r}$
		Read:	$pdf_{\text{biased}} = (\Sigma_t - c\mu)e^{-(\Sigma_t - c\mu)r}$
Pg. 145	Eq. 7.19	For:	$r = -\frac{1}{\Sigma_t}\ell n[1 - \eta(1 - e)^{-\Sigma_t u}]$
		Read:	$r = -\frac{1}{\Sigma_t}\ell n[1 - \eta(1 - e^{-\Sigma_t u})]$
Pg. 152	Eq. (7.34)	For:	$\psi(p) = \int dP' K(p' \to p)\psi(p') + q(p)$
		Read:	$\psi(p) = \int dp' K(p' \to p)\psi(p') + q(p)$
Pg. 154	Eq. 7.41	For:	$q^+(\bar{r}, E, \hat{\Omega}) = \frac{\sigma_d(\bar{r}, E, \hat{\Omega})}{\int_0^\infty dE' \int_{4\pi} d\hat{\Omega}' \sigma_d(\bar{r}, E, \hat{\Omega})\psi(\bar{r}, E', \hat{\Omega}')}$,
		Read:	$q^+(\bar{r}, E, \hat{\Omega}) = \frac{\Sigma_d(\bar{r}, E, \hat{\Omega})}{\int_0^\infty dE' \int_{4\pi} d\hat{\Omega}' \Sigma_d(\bar{r}, E, \hat{\Omega})\psi(\bar{r}, E', \hat{\Omega}')}$,
Pg. 163	Line -7	"counterarray"	"counter array"
Pg. 166	Eq. 8.19	For:	$\phi(\bar{r}_i, E_j) = \frac{\sum_{k=1}^{K} p(i,j,k)}{H\Delta V_i \Delta E_j}\left\{\frac{cm^3 - eV - s}{\frac{source}{s}}\right\}$
		Read:	$\phi(\bar{r}_i, E_j) = \frac{\sum_{k=1}^{K} p(i,j,k)}{H\Delta V_i \Delta E_j}\left\{\frac{\frac{path - length(cm)}{cm^3 - eV - s}}{\frac{source}{s}}\right\}$
Pg. 171	Fig. 8.4	REPLACE (attached)	
Pg. 183	Line 3 from bottom of the page	Cell 1: $+1 \cap (-2 \cap -3) \cap -7 \cap +8$	Cell 1: $+1 \cap (-2 \cup -3) \cap -7 \cap +8$

Pg. 194	Eq. – (first on page)	For:	$H = \hat{\Omega} \cdot \nabla + \sum_t (\bar{r}, E) - \int_0^\infty dE' \int_{4\pi} d\Omega' \sum_s (\bar{r}, E' \rightarrow \mathrm{E}, \mu_0)$
		Read:	$H = \hat{\Omega} \cdot \nabla + \Sigma_t (\bar{r}, E) - \int_0^\infty dE' \int_{4\pi} d\Omega' \Sigma_s (\bar{r}, E' \rightarrow \mathrm{E}, \mu_0)$
Pg. 194	Eq. – (second on page	For:	$F = \frac{\chi(E)}{4\pi} \int_0^\infty dE' \int_{4\pi} d\Omega' \nu \sum_f (\bar{r}, E')$
		Read:	$F = \frac{\chi(E)}{4\pi} \int_0^\infty dE' \int_{4\pi} d\Omega' \nu \Sigma_f (\bar{r}, E')$
Pg. 198	Eq. 10.11	$P(n-1) \leq \eta \leq P(n)$	$P(n-1) < \eta \leq P(n)$
Pg. 200	Table 10.1, Item 6b, Line 2	"Equation (10.9)"	"Equation (10.18)"
Pg. 201	Line 13	"k = 1.3"	"k = 1.2"
Pg. 201	Line 13	"1m000"	"1,000"
Pg. 202	Table 10.4, Item 5, Line 2	" (10.8) and (10.10)"	"(10.17) and (10.19)"
Pg. 203	Eq. 10.22	$S = w \frac{\Sigma_k f_k \overline{v_k} \Sigma_k}{\Sigma_k f_k \Sigma_k}$	$S = w \frac{\Sigma_k f_k \bar{v}_k \Sigma_{fk}}{\Sigma_k f_k \Sigma_{tk}}$
Pg. 203	Eq. 10.23	$S = w \frac{\bar{v} \Sigma_{fk}}{\Sigma_{ak}}$	$S = w \frac{\Sigma_k f_k \bar{v}_k \Sigma_{fk}}{\Sigma_k f_k \Sigma_{ak}}$
Pg. 203	Eq. (10.24)	$S = w \cdot \alpha \cdot d \sum_k f_k \bar{v}_k \Sigma_{fk}$	$S = w \cdot d \sum_k f_k \bar{v}_k \Sigma_{fk}$
Pg. 203	Line after Eq. 10.24	where ~~α refers to atomic density of material and~~ *d* is the path length from the last collision.	where *d* is the path length from the last collision.
Pg. 204	Line -4	"Equation (10.23)"	"Equation (10.25)"
Pg. 207	Line -11	"Equation (10.27)"	"Equation (10.29)"
Pg. 207	Line -8	"Equation (10.27)"	"Equation (10.29)"
Pg. 209	Eq. 10.32(+1)	For:	$\tilde{F} = \frac{1}{4\pi} \int_0^\infty dE' \int_{4\pi} d\Omega' \nu \sigma_f (\bar{r}_i, E')$
		Read:	$\tilde{F} = \frac{1}{4\pi} \int_0^\infty dE' \int_{4\pi} d\Omega' \nu \Sigma_f (\bar{r}_i, E')$

Pg. 209	Eq. 10.34a	$F\psi = \frac{1}{k}\left(\tilde{F}H^{-1}\chi\right)\tilde{F}\psi$	$\tilde{F}\psi = \frac{1}{k}\left(\tilde{F}H^{-1}\chi\right)\tilde{F}\psi$
Pg. 210	Line 9	"Equation (10.35b)"	"Equation (10.34b)"
Pg. 211	Line 4	"Equation (10.35)"	"Equation (10.36)"
Pg. 252	Line -5	" u and u' "	" μ and μ' "
Pg. 252	Eq. A3.12	For:	$u' = u\mu_0 + \sqrt{1-u^2}\sqrt{1-\mu_0^2}\cos\varphi_0$
		Read:	$\mu' = \mu\mu_0 + \sqrt{1-\mu^2}\sqrt{1-\mu_0^2}\cos\varphi_0$
Pg. 258	Eq. A5.10	For:	$f(E) = \frac{2}{\sqrt{\pi}}\frac{1}{KT}\sqrt{\frac{E}{KT}}^{-\frac{E}{KT}}$
		Read:	$f(E) = \frac{2}{\sqrt{\pi}}\frac{1}{KT}\sqrt{\frac{E}{kT}}e^{-\frac{E}{kT}}$