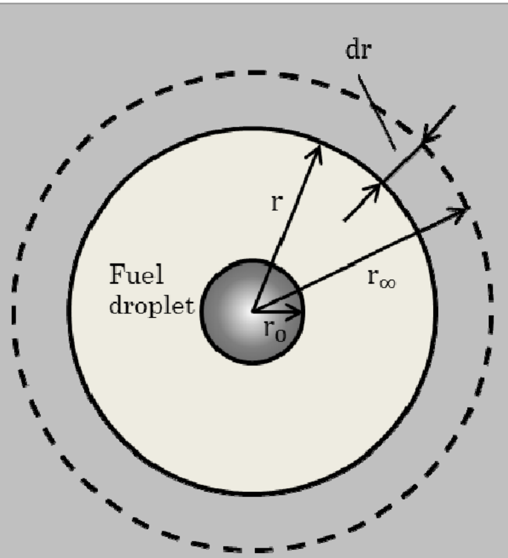
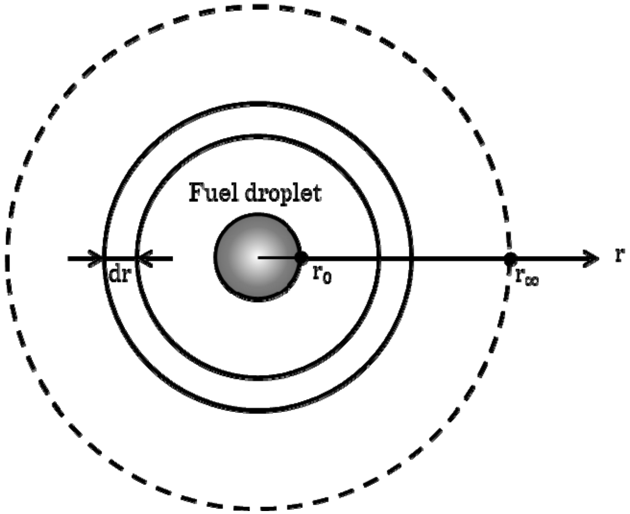
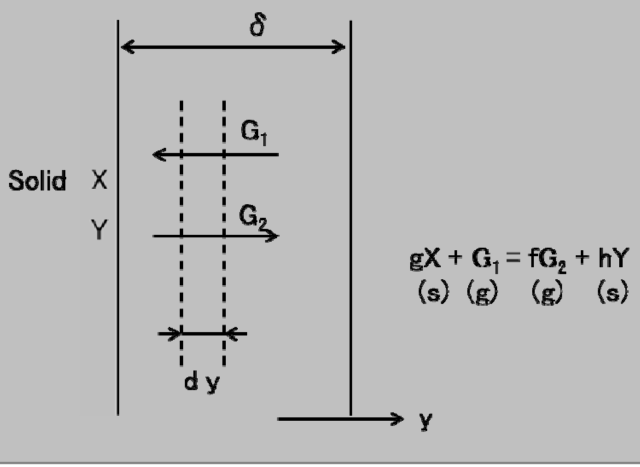
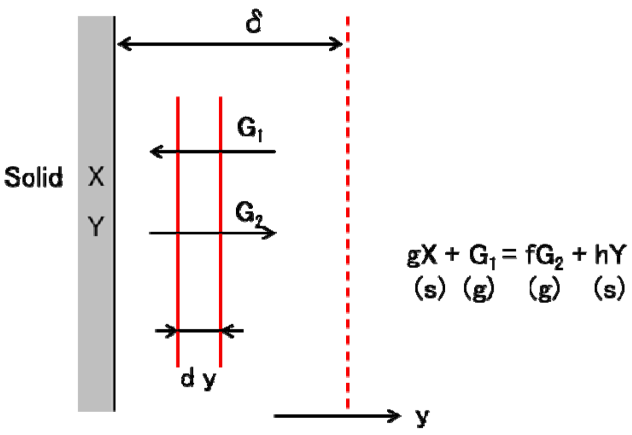
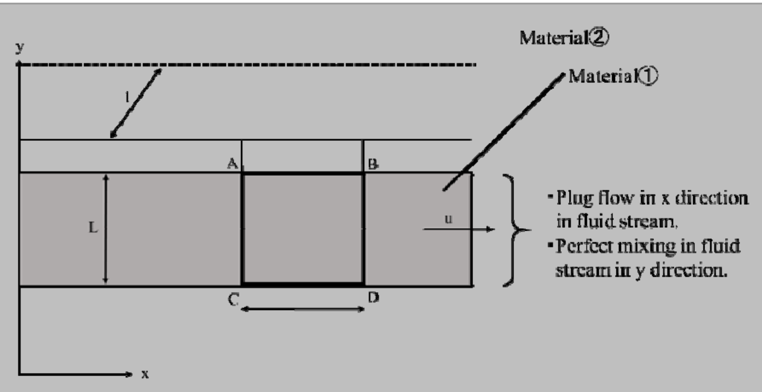
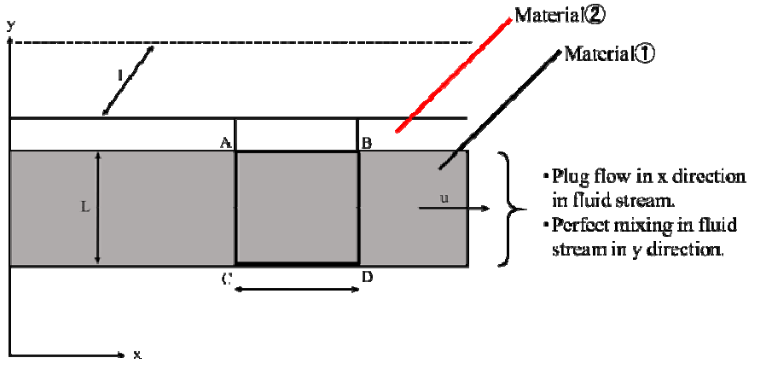
『高温材料プロセスにおける物質移動の基礎とケーススタディー』（初版 2015 年 10 月 1 日）正誤表

	誤	正
p. 1，左列下 2 行目	between gas/solid. Temperature is at high.	between gas/solid at high temperature (~2300 ℃).
p. 2，右列上 4 行目	at high temperature.	at high temperature (~3000 ℃).
p. 3，左列下 2 行目	Main reaction occurs gas/solid interface	Main reaction occurs at gas/solid interface
p. 4，参考図 1-1	water cooled refracty lining 炉体耐火物	water cooled refractory lining 炉体耐火物
p. 7，式(1-10)	gradient of (thermal energy/volume) (J/m^4)	gradient of (thermal energy/volume) ($J/m^3/m$)
p. 7，式(1-11)	$\tau_{xy} = -\mu\frac{du_x}{dy} = -\left(\frac{\mu}{\rho}\right)\frac{d(\rho u_x)}{dy}$	$\tau_{yx} = -\mu\frac{du_x}{dy} = -\left(\frac{\mu}{\rho}\right)\frac{d(\rho u_x)}{dy}$
p. 7，右列上 7 行目	熱エネルギー	熱量
p. 11，左列上 5 行目	Mass transfe may take place by	Mass transfer may take place by
p. 11，左列上 12 行目	Mass transfer due to densily differences	Mass transfer due to density differences
p. 11，左列上 13 行目	from concentration gradient	from concentration gradient (natural convection)
p. 11, Fig. 2-1	Zn(1)	Zn(ℓ)
p. 11，左列下 2 行目	The following equation descrives	The following equation describes
p. 13，左列上 4 行目	innert marker.	inert marker.
p. 13，式(2-8)	where u_i is diffusion velocity of componant i.	where u_i is diffusion velocity of component i.
p. 14，式(2-20)	$\frac{\dot{n}_2}{A} = -D_{2,1}\frac{\partial C_2}{\partial y} + X_1(\frac{\dot{n}_1}{A} + \frac{\dot{n}_2}{A})$	$\frac{\dot{n}_2}{A} = -D_{2,1}\frac{\partial C_2}{\partial y} + X_2(\frac{\dot{n}_1}{A} + \frac{\dot{n}_2}{A})$
p. 16，左列上 8 行目	粒子の径を ro とし、	粒子の径を r_o とし、
p. 16, Fig. 2-3		

		
p. 17, 式(2-32)下	0 for stagnant medium ②	0 for stagnant medium <2>
p. 17, 左列下 1 行目	$\therefore \ln(1-X_1)\frac{1}{r}\left(\frac{1}{r_0}-\frac{1}{r_\infty}\right)^{-1}\ln\frac{1-X_{1,0}}{1-X_{1,\infty}}+$	p. 18，右列上 1 行目に移動
p. 22, Fig. 2-6		

p. 22，式(2-77)	$\frac{\dot{n}_{G_2}}{A} = -f\frac{\dot{n}_{G_1}}{A},\ n_x = g\left\|\dot{n}_{G_1}\right\|$	$\frac{\dot{n}_{G_2}}{A} = -f\frac{\dot{n}_{G_1}}{A},\ \dot{n}_x = g\left\|\dot{n}_{G_1}\right\|$
p. 23，式(2-86)	$\frac{D_{G_1,G_2} \cdot C_T}{\left[1-(1-f)X_{G_1}\right]}\frac{dX_{G_1}}{dy} = \alpha\ (\text{const.})$	$\frac{1}{\left[1-(1-f)X_{G_1}\right]}\frac{dX_{G_1}}{dy} = \alpha\ (\text{const.})$
p. 24，右列下 4 行目	Perform a mole balance on each component separatelly	Perform a mole balance on each component separately
p. 25，左列上 2 行目	①stoichimetry	①stoichiometry
p. 25，式(2-95)左	Rate of imput of Zn	Rate of input of Zn
p. 25，左列上 6 行目	Similary, balance of O₂ is	Similarly, balance of O₂ is
p. 25，式(2-106)	$X_{Z_n}, X_{O_2} \ll 1,\ X_{N_2} \gg X_{O_2}, X_{Z_n}$	$X_{Zn}, X_{O_2} \ll 1,\ (X_{N_2} \gg X_{O_2}, X_{Zn})$
p. 25，左列下 1 行目	hence neglect bulk diffusion	hence neglect bulk diffusion (convection)
p. 26，式(2-107)	$\frac{\dot{n}_{Zn}}{A} = -D_{Zn,N_2}C_T\frac{dX_{Zn}}{dy} + X_{zn}\left(\frac{\dot{n}_{Zn}}{A} + \frac{\dot{n}_{O_2}}{A}\right)$	$\frac{\dot{n}_{Zn}}{A} = -D_{Zn,N_2}C_T\frac{dX_{Zn}}{dy} + X_{Zn}\left(\frac{\dot{n}_{Zn}}{A} + \frac{\dot{n}_{O_2}}{A}\right)$
p. 34，右列下 5 行目	In the vicinity next to the interface is a stagnant layar	In the vicinity next to the interface is a stagnant layer
p. 37，左列上 4 行目	1) Babbles rising through liquid	1) Bubbles rising through liquid
p. 37，左列上 5 行目	Fig. 3-4 Babbles rising through liquid.	Fig. 3-4 Bubbles rising through liquid.
p. 37，左列上 6 行目	velocity of rise of spherical cap babbles	velocity of rise of spherical cap bubbles
p. 39，左列上 2 行目	In this case it is supposed that an eddy penetrats	In this case it is supposed that an eddy penetrates
p. 39，左列上 3 行目	surface at the center of the bath and travels acrocss	surface at the center of the bath and travels across
p. 39，左列上 7 行目	In the case u_{r0}・r_o=const.	In the case u_{r_0}・r_o=const.
p. 45，式(4-15)	$\frac{\dot{n}_M}{A} = \frac{n_p}{A}$	$\frac{\dot{n}_M}{A} = \frac{\dot{n}_p}{A}$
p. 45，式(4-17)	$\frac{n_P}{A} = k_P(K \cdot C_M^* \cdot (C_N^b)^n - C_P^b)$	$\frac{\dot{n}_P}{A} = k_P(K \cdot C_M^* \cdot (C_N^b)^n - C_P^b)$

p. 45，式(4-18)	$\therefore \frac{n_M}{A} = k_P(K \cdot C_M^{*} \cdot (C_N^b)^n - C_P^b)$	$\therefore \frac{\dot{n}_M}{A} = k_P(K \cdot C_M^{*} \cdot (C_N^b)^n - C_P^b)$
p. 46，左列下 3 行目	律速課程	律速過程
p. 46，式(4-27)	$= \mathrm{k_{ov}}\left[\underbrace{\left(1+\frac{V_b}{V_S K(C_P^b)^n}\right)C_M^b}_{\alpha} - \underbrace{\left(\frac{V_b}{V_S K(C_P^b)^n}C_{M,0}^b + \frac{C_{P,0}^b}{K(C_N^b)^n}\right)}_{\beta}\right]$	※C_M^bの下は α 波線無し、β 波線ーの下まで $= \mathrm{k_{ov}}\left[\underbrace{\left(1+\frac{V_b}{V_S K(C_P^b)^n}\right)}_{\alpha}C_M^b \underbrace{- \left(\frac{V_b}{V_S K(C_P^b)^n}C_{M,0}^b + \frac{C_{P,0}^b}{K(C_N^b)^n}\right)}_{\beta}\right]$
p. 49，左列下 5 行目	Procedure : eliminate C_o^* to obtain a relationship	Procedure : eliminate C_o^* to obtain a relationship ※左詰めにする
p. 49，右列上 7 行目	律速課程	律速過程
p. 50，式(4-41)	$k_c(C_c^b - C_c^*) = k_o(C_c^b - \frac{P_{CO}^*}{KC_c^*})$	$k_c(C_c^b - C_c^*) = k_o(C_o^b - \frac{P_{CO}^*}{KC_c^*})$
p. 50，右列上 3 行目	rate controlling，$C_o^b \cong C_c^*$	rate controlling，$C_c^b \cong C_c^*$
p. 51，右列上 2 行目	律速課程	律速過程
p. 55，右列上 3 行目	①モル流速	①　モル流束
p. 55，式(5-8)	$AB = \frac{n_i}{A}dx1$	$AB = \frac{\dot{n}_i}{A}dx1$

p.56, Fig.5-1		
p. 57, 左列 5 行目	the blisten copper to the anode grade copper	the blister copper to the anode grade copper
p. 57, Fig.5-2	Anode furnece for deoxidation of molten blister copper.⁶⁾	Anode furnace for deoxidation of molten blister copper.⁶⁾
p. 58, 右列 16 行目	0.1 wt% of orygen in copper	0.1 wt% of oxygen in copper
p.61, 左列 15 行目	If we apply a molar balarce to the jet element “ds”,	If we apply a molar balance to the jet element “ds”,
p. 63, 式(5-34)	$$\frac{1}{1+\frac{k_{CO}\alpha' S_O}{Q}} < \frac{k_O \alpha' C_O^b RT}{k_{CO}\alpha' P_{CO}^b} < 1$$	$$\frac{1}{1+\frac{k_{CO}\alpha' S_O}{Q}} < \frac{k_O \alpha' C_O^b RT}{k_{CO}\alpha' P_{CO}^{b_i}} < 1$$
p. 69, 左列 16 行目	Identify the condition which each of steps is rate	Identify the condition in which each of steps is rate
p. 82, 右列 6 行目	$$\dot{n}_{O_2} = \frac{8 \times 1.73 \times \left(\frac{1}{82.1} \times 1123\right)}{\left(1-\frac{2}{3}\right) \times 1} \ln \frac{1-\left(1-\frac{2}{3}\right) \times 1}{1-\left(1-\frac{2}{3}\right) \times 0}$$	$$\dot{n}_{O_2} = \frac{8 \times 1.73 \times \left(\frac{1}{82.1 \times 1123}\right)}{\left(1-\frac{2}{3}\right) \times 1} \ln \frac{1-\left(1-\frac{2}{3}\right) \times 1}{1-\left(1-\frac{2}{3}\right) \times 0}$$
p. 83, タイトル	Fume Formation in basic oxygen furnace	Fume Formation in Basic Oxygen Furnace
p. 89, 式(6-3-27)	$$Y = \frac{\delta RTK_{ev}D_{Fe,g}P_{Fe,g}^{*} - 2D_{Fe,g}\sqrt{RT}D_{O_2,g}P_{O_2,\delta}}{2K_{ev}RTD_{O_2,\sigma}P_{O_2,\delta} + RTK_{ev}D_{Fe,g}P_{Fe}^{*}}$$	$$Y = \frac{\delta RTK_{ev}D_{Fe,g}P_{Fe,g}^{*} - 2D_{Fe,g}\sqrt{RT}D_{O_2,g}P_{O_2,\delta}}{2K_{ev}RTD_{O_2,g}P_{O_2,\delta} + RTK_{ev}D_{Fe,g}P_{Fe}^{*}}$$
p. 94, 式(6-4-2)	$Zn^{2+} + 2e = Zn$	$Zn^{2+} + 2e^{-} = Zn$
p. 102, 右列 12 行目	(a) $C_{W_b} \cong 0$ since tha volume of the steel is so much	(a) $C_{W_b} \simeq 0$ since the volume of the steel is so much

p. 111，式(6-6-19)	$-\frac{d[\%C]}{dt} = \dot{n}_C \times (60)^2 \times \frac{M_C}{L} \times A_{\mathrm{II}} \times \rho_{iron} \times 10^{-2}$ $= \frac{\frac{\dot{n}_C \times (60)^2 \times M_C}{L \times A_{\mathrm{I}} \times \rho_{iron} \times 10^{-2}}}{\left(\frac{1}{A_{\mathrm{II}} k_{O,\mathrm{II}}} + \frac{1}{A_{\mathrm{I}} k_{O,\mathrm{I}}} + \frac{K'_{\mathrm{I}}}{A_{\mathrm{I}} k_{FeO}}\right)} \left(K'_{\mathrm{I}} C^b_{FeO} - C^*_{O,\mathrm{II}}\right)$ $= 0.177 (wt\%\, C/hr)$	$-\frac{d[\%C]}{dt} = \dot{n}_C \times (60)^2 \times \frac{M_C}{L \times A_{\mathrm{II}} \times \rho_{iron} \times 10^{-2}}$ $= \frac{\frac{\dot{n}_C \times (60)^2 \times M_C}{L \times A_{\mathrm{II}} \times \rho_{iron} \times 10^{-2}}}{\left(\frac{1}{A_{\mathrm{II}} k_{O,\mathrm{II}}} + \frac{1}{A_{\mathrm{I}} k_{O,\mathrm{I}}} + \frac{K'_{\mathrm{I}}}{A_{\mathrm{I}} k_{FeO}}\right)} \left(K'_{\mathrm{I}} C^b_{FeO} - C^*_{O,\mathrm{II}}\right)$ $= 0.177 (wt\%\, C/hr)$
p. 113，左列 19 行目	Density of molten steel @ 1540℃ =7.4 g cm^{-3}	Density of molten steel at 1540℃ =7.4 g cm^{-3}
p. 116，右列 10 行目	③stoickiometory	② stoichiometry
p. 116，式(6-7-9)	$2k_0 \left\{\frac{P^b_{O_2}}{RT} - \frac{(C^b_0)^2}{K^2 RT}\right\} = \frac{\pi d}{4} \frac{dC^b_0}{dx}$	$2k_0 \left\{\frac{P^b_{O_2}}{RT} - \frac{(C^b_0)^2}{K^2 RT}\right\} = \frac{vd}{4} \frac{dC^b_0}{dx}$
p. 117，式(6-7-14)	$\therefore \frac{16(P^b_{O_2})^{\frac{1}{2}} \cdot k_O \cdot \ell}{vdRTK} = \ln \left\{ \frac{(P^b_{O_2})^{\frac{1}{2}} + \frac{C^b_{O,1}}{K}}{(P^b_{O_2})^{\frac{1}{2}} + \frac{C^b_{O,0}}{K}} \cdot \frac{(P^b_{O_2})^{\frac{1}{2}} - \frac{C^b_{O,0}}{K}}{(P^b_{O_2})^{\frac{1}{2}} - \frac{C^b_{O,1}}{K}} \right\}$	$\therefore \frac{16(P^b_{O_2})^{\frac{1}{2}} \cdot k_O \cdot \ell}{vdRTK} = \ln \left\{ \frac{(P^b_{O_2})^{\frac{1}{2}} + \frac{C^b_{O,\ell}}{K}}{(P^b_{O_2})^{\frac{1}{2}} + \frac{C^b_{O,0}}{K}} \cdot \frac{(P^b_{O_2})^{\frac{1}{2}} - \frac{C^b_{O,0}}{K}}{(P^b_{O_2})^{\frac{1}{2}} - \frac{C^b_{O,\ell}}{K}} \right\}$
p. 117，上から 8 式目	$\ln \left\{ \frac{(0.21)^{\frac{1}{2}} + \frac{C^b_{O,1}}{1.6}}{(0.21)^{\frac{1}{2}} + \frac{4.5 \times 10^{-6}}{1.6}} \times \frac{(0.21)^{\frac{1}{2}} - \frac{4.5 \times 10^{-6}}{1.6}}{(0.21)^{\frac{1}{2}} - \frac{C^b_{O,1}}{1.6}} \right\} =$	$\ln \left\{ \frac{(0.21)^{\frac{1}{2}} + \frac{C^b_{O,\ell}}{1.6}}{(0.21)^{\frac{1}{2}} + \frac{4.5 \times 10^{-6}}{1.6}} \times \frac{(0.21)^{\frac{1}{2}} - \frac{4.5 \times 10^{-6}}{1.6}}{(0.21)^{\frac{1}{2}} - \frac{C^b_{O,\ell}}{1.6}} \right\} =$
p.130,最左列 10 行目	blisten copper 57	blister copper 57
p.130,最左列 11 行目	bottom browing 124	bottom blowing 124