# ELECTRONIC SUPPLEMENTARY INFORMATION

## On approach to increase integration rate of elements of an four-cascade amplifier circuit


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Equations for the functions $\tilde{I}_{ijk}(\chi,\eta,\phi,\vartheta)$ and $\tilde{V}_{ijk}(\chi,\eta,\phi,\vartheta)$, $i \geq 0$, $j \geq 0$, $k \geq 0$ and conditions for them

$$\frac{\partial \tilde{I}_{000}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta} = \sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{I}_{000}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2} + \frac{\partial^2 \tilde{I}_{000}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2} + \frac{\partial^2 \tilde{I}_{000}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]$$

$$\frac{\partial \tilde{V}_{000}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta} = \sqrt{\frac{D_{0V}}{D_{0I}}}\left[\frac{\partial^2 \tilde{V}_{000}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2} + \frac{\partial^2 \tilde{V}_{000}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2} + \frac{\partial^2 \tilde{V}_{000}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right];$$

$$\frac{\partial \tilde{I}_{i00}(\chi,\vartheta)}{\partial \vartheta} = \sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{I}_{i00}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2} + \frac{\partial^2 \tilde{I}_{i00}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2} + \frac{\partial^2 \tilde{I}_{i00}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right] + \sqrt{\frac{D_{0I}}{D_{0V}}} \times$$
$$\times \left\{\frac{\partial}{\partial \chi}\left[g_I(\chi,\eta,\phi,T)\frac{\partial \tilde{I}_{i-100}(\chi,\eta,\phi,\vartheta)}{\partial \chi}\right] + \frac{\partial}{\partial \eta}\left[g_I(\chi,\eta,\phi,T)\frac{\partial \tilde{I}_{i-100}(\chi,\eta,\phi,\vartheta)}{\partial \eta}\right] + \right.$$
$$\left. + \frac{\partial}{\partial \phi}\left[g_I(\chi,\eta,\phi,T)\frac{\partial \tilde{I}_{i-100}(\chi,\eta,\phi,\vartheta)}{\partial \phi}\right]\right\},\ i \geq 1,$$

$$\frac{\partial \tilde{V}_{i00}(\chi,\vartheta)}{\partial \vartheta} = \sqrt{\frac{D_{0V}}{D_{0I}}}\left[\frac{\partial^2 \tilde{V}_{i00}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2} + \frac{\partial^2 \tilde{V}_{i00}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2} + \frac{\partial^2 \tilde{V}_{i00}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right] + \frac{\partial}{\partial \chi}\left[g_V(\chi,\eta,\phi,T) \times \right.$$
$$\left. \times \frac{\partial \tilde{V}_{i-100}(\chi,\eta,\phi,\vartheta)}{\partial \chi}\right]\sqrt{\frac{D_{0V}}{D_{0I}}} + \sqrt{\frac{D_{0V}}{D_{0I}}}\frac{\partial}{\partial \eta}\left[g_V(\chi,\eta,\phi,T)\frac{\partial \tilde{V}_{i-100}(\chi,\eta,\phi,\vartheta)}{\partial \eta}\right] + \frac{\partial}{\partial \phi}\left[g_V(\chi,\eta,\phi,T) \times \right.$$
$$\left. \times \frac{\partial \tilde{V}_{i-100}(\chi,\eta,\phi,\vartheta)}{\partial \phi}\right]\sqrt{\frac{D_{0V}}{D_{0I}}},\ i \geq 1,$$

$$\frac{\partial \tilde{I}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta} = \sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{I}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2} + \frac{\partial^2 \tilde{I}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2} + \frac{\partial^2 \tilde{I}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right] -$$
$$-\left[1 + \varepsilon_{I,V} g_{I,V}(\chi,\eta,\phi,T)\right]\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)\tilde{V}_{000}(\chi,\eta,\phi,\vartheta)$$

$$\frac{\partial \tilde{V}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta} = \sqrt{\frac{D_{0V}}{D_{0I}}}\left[\frac{\partial^2 \tilde{V}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2} + \frac{\partial^2 \tilde{V}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2} + \frac{\partial^2 \tilde{V}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right] -$$

$$-\left[1+\varepsilon_{I,V}\,g_{I,V}(\chi,\eta,\phi,T)\right]\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)\tilde{V}_{000}(\chi,\eta,\phi,\vartheta);$$

$$\frac{\partial \tilde{I}_{020}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{I}_{020}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{I}_{020}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{I}_{020}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]-$$

$$-\left[1+\varepsilon_{I,V}\,g_{I,V}(\chi,\eta,\phi,T)\right]\left[\tilde{I}_{010}(\chi,\eta,\phi,\vartheta)\tilde{V}_{000}(\chi,\eta,\phi,\vartheta)+\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)\tilde{V}_{010}(\chi,\eta,\phi,\vartheta)\right]$$

$$\frac{\partial \tilde{V}_{020}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{V}_{020}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{V}_{020}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{V}_{020}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]-$$

$$-\left[1+\varepsilon_{I,V}\,g_{I,V}(\chi,\eta,\phi,T)\right]\left[\tilde{I}_{010}(\chi,\eta,\phi,\vartheta)\tilde{V}_{000}(\chi,\eta,\phi,\vartheta)+\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)\tilde{V}_{010}(\chi,\eta,\phi,\vartheta)\right];$$

$$\frac{\partial \tilde{I}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{I}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{I}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{I}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]-$$

$$-\left[1+\varepsilon_{I,I}\,g_{I,I}(\chi,\eta,\phi,T)\right]\tilde{I}^2_{000}(\chi,\eta,\phi,\vartheta)$$

$$\frac{\partial \tilde{V}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0V}}{D_{0I}}}\left[\frac{\partial^2 \tilde{V}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{V}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{V}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]-$$

$$-\left[1+\varepsilon_{I,I}\,g_{I,I}(\chi,\eta,\phi,T)\right]\tilde{V}^2_{000}(\chi,\eta,\phi,\vartheta);$$

$$\frac{\partial \tilde{I}_{110}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{I}_{110}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{I}_{110}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{I}_{110}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]+\sqrt{\frac{D_{0I}}{D_{0V}}}\times$$

$$\times\left\{\frac{\partial}{\partial \chi}\left[g_I(\chi,\eta,\phi,T)\frac{\partial \tilde{I}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \chi}\right]+\frac{\partial}{\partial \eta}\left[g_I(\chi,\eta,\phi,T)\frac{\partial \tilde{I}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \eta}\right]+\frac{\partial}{\partial \phi}\left[g_I(\chi,\eta,\phi,T)\times\right.\right.$$

$$\left.\left.\times\frac{\partial \tilde{I}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \phi}\right]\right\}-\left[\tilde{I}_{100}(\chi,\eta,\phi,\vartheta)\tilde{V}_{000}(\chi,\eta,\phi,\vartheta)+\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)\tilde{V}_{100}(\chi,\eta,\phi,\vartheta)\right]\times$$

$$\times\left[1+\varepsilon_{I,I}\,g_{I,I}(\chi,\eta,\phi,T)\right]$$

$$\frac{\partial \tilde{V}_{110}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0V}}{D_{0I}}}\left[\frac{\partial^2 \tilde{V}_{110}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{V}_{110}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{V}_{110}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]+$$

$$+\sqrt{\frac{D_{0V}}{D_{0I}}}\left\{\frac{\partial}{\partial \chi}\left[g_V(\chi,\eta,\phi,T)\frac{\partial \tilde{V}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \chi}\right]+\frac{\partial}{\partial \eta}\left[g_V(\chi,\eta,\phi,T)\frac{\partial \tilde{V}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \eta}\right]+\right.$$

$$\left.+\frac{\partial}{\partial \phi}\left[g_V(\chi,\eta,\phi,T)\frac{\partial \tilde{V}_{010}(\chi,\eta,\phi,\vartheta)}{\partial \phi}\right]\right\}-\left[1+\varepsilon_{V,V}\,g_{V,V}(\chi,\eta,\phi,T)\right]\times$$

$$\times\left[\tilde{V}_{100}(\chi,\eta,\phi,\vartheta)\,\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)+\tilde{V}_{000}(\chi,\eta,\phi,\vartheta)\tilde{I}_{100}(\chi,\eta,\phi,\vartheta)\right];$$

$$\frac{\partial \tilde{I}_{002}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{I}_{002}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{I}_{002}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{I}_{002}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]-$$

$$-\left[1+\varepsilon_{I,I}\,g_{I,I}(\chi,\eta,\phi,T)\right]\tilde{I}_{001}(\chi,\eta,\phi,\vartheta)\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)$$

$$\frac{\partial \tilde{V}_{002}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0V}}{D_{0I}}}\left[\frac{\partial^2 \tilde{V}_{002}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{V}_{002}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{V}_{002}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]-$$

$$-\left[1+\varepsilon_{V,V}\,g_{V,V}(\chi,\eta,\phi,E)\right]\tilde{V}_{001}(\chi,\eta,\phi,\vartheta)\tilde{V}_{000}(\chi,\eta,\phi,\vartheta);$$

$$\frac{\partial \tilde{I}_{101}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{I}_{101}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{I}_{101}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{I}_{101}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]+$$

$$+\sqrt{\frac{D_{0I}}{D_{0V}}}\left\{\frac{\partial}{\partial \chi}\left[g_I(\chi,\eta,\phi,T)\frac{\partial \tilde{I}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \chi}\right]+\frac{\partial}{\partial \eta}\left[g_I(\chi,\eta,\phi,T)\frac{\partial \tilde{I}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \eta}\right]+\right.$$

$$\left.+\frac{\partial}{\partial \phi}\left[g_I(\chi,\eta,\phi,T)\frac{\partial \tilde{I}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \phi}\right]\right\}-\left[1+\varepsilon_I\,g_I(\chi,\eta,\phi,T)\right]\tilde{I}_{100}(\chi,\eta,\phi,\vartheta)\tilde{V}_{000}(\chi,\eta,\phi,\vartheta)$$

$$\frac{\partial \tilde{V}_{101}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0V}}{D_{0I}}}\left[\frac{\partial^2 \tilde{V}_{101}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{V}_{101}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{V}_{101}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]+$$

$$+\sqrt{\frac{D_{0V}}{D_{0I}}}\left\{\frac{\partial}{\partial \chi}\left[g_V(\chi,\eta,\phi,T)\frac{\partial \tilde{V}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \chi}\right]+\frac{\partial}{\partial \eta}\left[g_V(\chi,\eta,\phi,T)\frac{\partial \tilde{V}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \eta}\right]+\right.$$

$$\left.+\frac{\partial}{\partial \phi}\left[g_V(\chi,\eta,\phi,T)\frac{\partial \tilde{V}_{001}(\chi,\eta,\phi,\vartheta)}{\partial \phi}\right]\right\}-\left[1+\varepsilon_V\,g_V(\chi,\eta,\phi,T)\right]\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)\tilde{V}_{100}(\chi,\eta,\phi,\vartheta)$$

;

$$\frac{\partial \tilde{I}_{011}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0I}}{D_{0V}}}\left[\frac{\partial^2 \tilde{I}_{011}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{I}_{011}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{I}_{011}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]-\tilde{I}_{010}(\chi,\eta,\phi,\vartheta)\times$$

$$\times\left[1+\varepsilon_{I,I}\,g_{I,I}(\chi,\eta,\phi,T)\right]\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)-\left[1+\varepsilon_{I,V}\,g_{I,V}(\chi,\eta,\phi,T)\right]\tilde{I}_{001}(\chi,\eta,\phi,\vartheta)\tilde{V}_{000}(\chi,\eta,\phi,\vartheta)$$

$$\frac{\partial \tilde{V}_{011}(\chi,\eta,\phi,\vartheta)}{\partial \vartheta}=\sqrt{\frac{D_{0V}}{D_{0I}}}\left[\frac{\partial^2 \tilde{V}_{011}(\chi,\eta,\phi,\vartheta)}{\partial \chi^2}+\frac{\partial^2 \tilde{V}_{011}(\chi,\eta,\phi,\vartheta)}{\partial \eta^2}+\frac{\partial^2 \tilde{V}_{011}(\chi,\eta,\phi,\vartheta)}{\partial \phi^2}\right]-\tilde{V}_{010}(\chi,\eta,\phi,\vartheta)\times$$

$$\times\left[1+\varepsilon_{V,V}\,g_{V,V}(\chi,\eta,\phi,T)\right]\tilde{V}_{000}(\chi,\eta,\phi,\vartheta)-\left[1+\varepsilon_{I,V}\,g_{I,V}(\chi,\eta,\phi,t)\right]\tilde{I}_{000}(\chi,\eta,\phi,\vartheta)\tilde{V}_{001}(\chi,\eta,\phi,\vartheta)$$

;

$$\left.\frac{\partial \tilde{\rho}_{ijk}(\chi,\eta,\phi,\vartheta)}{\partial \chi}\right|_{x=0}=0,\ \left.\frac{\partial \tilde{\rho}_{ijk}(\chi,\eta,\phi,\vartheta)}{\partial \chi}\right|_{x=1}=0,\ \left.\frac{\partial \tilde{\rho}_{ijk}(\chi,\eta,\phi,\vartheta)}{\partial \eta}\right|_{\eta=0}=0,$$

$$\left.\frac{\partial \tilde{\rho}_{ijk}(\chi,\eta,\phi,\vartheta)}{\partial \eta}\right|_{\eta=1}=0,$$

$$\left.\frac{\partial \tilde{\rho}_{ijk}(\chi,\eta,\phi,\vartheta)}{\partial \phi}\right|_{\phi=0}=0,\ \left.\frac{\partial \tilde{\rho}_{ijk}(\chi,\eta,\phi,\vartheta)}{\partial \phi}\right|_{\phi=1}=0\ \ (i\geq 0,\ j\geq 0,\ k\geq 0);$$

$$\tilde{\rho}_{000}(\chi,\eta,\phi,0)=f_\rho(\chi,\eta,\phi)/\rho^*,\ \tilde{\rho}_{ijk}(\chi,\eta,\phi,0)=0\ \ (i\geq 1,\ j\geq 1,\ k\geq 1).$$

Solutions of the above equations could be written as

$$\tilde{\rho}_{000}(\chi,\eta,\phi,\vartheta)=\frac{1}{L}+\frac{2}{L}\sum_{n=1}^{\infty}F_{n\rho}c(\chi)c(\eta)c(\phi)e_{n\rho}(\vartheta),$$

where $F_{n\rho}=\frac{1}{\rho^*}\int\limits_0^1 cos(\pi n u)\int\limits_0^1 cos(\pi n v)\int\limits_0^1 cos(\pi n w) f_{n\rho}(u,v,w)\,d\,w\,d\,v\,d\,u$, $c_n(\chi)$ = $cos$ ($\pi$ $n$ $\chi$), $e_{nI}(\vartheta)=exp\left(-\pi^2 n^2\vartheta\sqrt{D_{0V}/D_{0I}}\right)$, $e_{nV}(\vartheta)=exp\left(-\pi^2 n^2\vartheta\sqrt{D_{0I}/D_{0V}}\right)$;

$$\tilde{I}_{i00}(\chi,\eta,\phi,\vartheta)=-2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty}n c_n(\chi)c(\eta)c(\phi)e_{nI}(\vartheta)\int\limits_0^{\vartheta}e_{nI}(-\tau)\int\limits_0^1 s_n(u)\int\limits_0^1 c_n(v)\int\limits_0^1\frac{\partial \tilde{I}_{i-100}(u,v,w,\tau)}{\partial u}\times$$

$$\times c_n(w)g_I(u,v,w,T)\,d\,w\,d\,v\,d\,u\,d\,\tau-2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty}n c_n(\chi)c(\eta)c(\phi)e_{nI}(\vartheta)\int\limits_0^{\vartheta}e_{nI}(-\tau)\int\limits_0^1 c_n(u)\int\limits_0^1 s_n(v)\times$$

$$\times\int\limits_0^1 c_n(w)g_I(u,v,w,T)\frac{\partial \tilde{I}_{i-100}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau-2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty}n c_n(\chi)c(\eta)c(\phi)e_{nI}(\vartheta)\int\limits_0^{\vartheta}e_{nI}(-\tau)\times$$

$$\times\int\limits_0^1 c_n(u)\int\limits_0^1 c_n(v)\int\limits_0^1 s_n(w)g_I(u,v,w,T)\frac{\partial \tilde{I}_{i-100}(u,v,w,\tau)}{\partial w}d\,w\,d\,v\,d\,u\,d\,\tau,\ i\geq 1,$$

$$\tilde{V}_{i00}(\chi,\eta,\phi,\vartheta)=-2\pi\sqrt{\frac{D_{0V}}{D_{0I}}}\sum_{n=1}^{\infty}n c_n(\chi)c(\eta)c(\phi)e_{nV}(\vartheta)\int\limits_0^{\vartheta}e_{nI}(-\tau)\int\limits_0^1 s_n(u)\int\limits_0^1 c_n(v)\int\limits_0^1 g_V(u,v,w,T)\times$$

$$\times c_n(w)\frac{\partial \tilde{V}_{i-100}(u,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\,\tau-\sqrt{\frac{D_{0V}}{D_{0I}}}\sum_{n=1}^{\infty}n c_n(\chi)c(\eta)c(\phi)e_{nV}(\vartheta)\int\limits_0^{\vartheta}e_{nI}(-\tau)\int\limits_0^1 c_n(u)\int\limits_0^1 s_n(v)\times$$

$$\times 2\pi\int\limits_0^1 c_n(w)\,g_V(u,v,w,T)\frac{\partial \tilde{V}_{i-100}(u,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau-2\pi\sqrt{\frac{D_{0V}}{D_{0I}}}\sum_{n=1}^{\infty}n c_n(\chi)c(\eta)c(\phi)e_{nV}(\vartheta)\times$$

$$\times\int_0^{\vartheta} e_{nI}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 s_n(w) g_V(u,v,w,T)\frac{\partial \tilde{V}_{i-100}(u,\tau)}{\partial w} d\,w\,d\,v\,d\,u\,d\,\tau\,,\ i\ge 1,$$

where $s_n(\chi) = sin\ (\pi\, n\, \chi)$;

$$\tilde{\rho}_{010}(\chi,\eta,\phi,\vartheta) = -2\sum_{n=1}^{\infty} c_n(\chi)c_n(\eta)c_n(\phi)e_{n\rho}(\vartheta)\int_0^{\vartheta} e_{n\rho}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 c_n(w)\times$$

$$\times\left[1+\varepsilon_{I,V} g_{I,V}(u,v,w,T)\right]\tilde{I}_{000}(u,v,w,\tau)\,\tilde{V}_{000}(u,v,w,\tau)\,d\,w\,d\,v\,d\,u\,d\,\tau\,;$$

$$\tilde{\rho}_{020}(\chi,\eta,\phi,\vartheta) = -2\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty} c_n(\chi)c_n(\eta)\,c_n(\phi)e_{n\rho}(\vartheta)\int_0^{\vartheta} e_{n\rho}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 c_n(w)\left[1+\varepsilon_{I,V}\times\right.$$

$$\left.\times\, g_{I,V}(u,v,w,T)\right]\left[\tilde{I}_{010}(u,v,w,\tau)\tilde{V}_{000}(u,v,w,\tau)+\tilde{I}_{000}(u,v,w,\tau)\tilde{V}_{010}(u,v,w,\tau)\right]d\,w\,d\,v\,d\,u\,d\,\tau$$

;

$$\tilde{\rho}_{001}(\chi,\eta,\phi,\vartheta) = -2\sum_{n=1}^{\infty} c_n(\chi)c_n(\eta)c_n(\phi)e_{n\rho}(\vartheta)\int_0^{\vartheta} e_{n\rho}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 c_n(w)\times$$

$$\times\left[1+\varepsilon_{\rho,\rho} g_{\rho,\rho}(u,v,w,T)\right]\tilde{\rho}_{000}^{2}(u,v,w,\tau)\,d\,w\,d\,v\,d\,u\,d\,\tau\,;$$

$$\tilde{\rho}_{002}(\chi,\eta,\phi,\vartheta) = -2\sum_{n=1}^{\infty} c_n(\chi)c_n(\eta)c_n(\phi)e_{n\rho}(\vartheta)\int_0^{\vartheta} e_{n\rho}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 c_n(w)\times$$

$$\times\left[1+\varepsilon_{\rho,\rho} g_{\rho,\rho}(u,v,w,T)\right]\tilde{\rho}_{001}(u,v,w,\tau)\tilde{\rho}_{000}(u,v,w,\tau)\,d\,w\,d\,v\,d\,u\,d\,\tau\,;$$

$$\tilde{I}_{110}(\chi,\eta,\phi,\vartheta) = -2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty} n\,c_n(\chi)c_n(\eta)c_n(\phi)e_{nI}(\vartheta)\int_0^{\vartheta} e_{nI}(-\tau)\int_0^1 s_n(u)\int_0^1 c_n(v)\int_0^1 c_n(u)\times$$

$$\times\, g_I(u,v,w,T)\frac{\partial \tilde{I}_{i-100}(u,v,w,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\,\tau - 2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty} n\,c_n(\chi)c_n(\eta)c_n(\phi)e_{nI}(\vartheta)\times$$

$$\times\int_0^{\vartheta} e_{nI}(-\tau)\int_0^1 c_n(u)\int_0^1 s_n(v)\int_0^1 c_n(u)\,g_I(u,v,w,T)\frac{\partial \tilde{I}_{i-100}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau - 2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\times$$

$$\times\sum_{n=1}^{\infty} n\; e_{nI}(\vartheta)\int_0^{\vartheta} e_{nI}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 s_n(u)\,g_I(u,v,w,T)\frac{\partial \tilde{I}_{i-100}(u,v,w,\tau)}{\partial w}d\,w\,d\,v\,d\,u\,d\,\tau\times$$

$$\times\, c_n(\chi)c_n(\eta)c_n(\phi) - 2\sum_{n=1}^{\infty} c_n(\chi)e_{nI}(\vartheta)c_n(\eta)c_n(\phi)\int_0^{\vartheta} e_{nI}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 c_n(v)\left[1+\varepsilon_{I,V}\times\right.$$

$$\left.\times g_{I,V}(u,v,w,T)\right]\left[\tilde{I}_{100}(u,v,w,\tau)\tilde{V}_{000}(u,v,w,\tau)+\tilde{I}_{000}(u,v,w,\tau)\tilde{V}_{100}(u,v,w,\tau)\right]d\,w\,d\,v\,d\,u\,d\,\tau$$

$$\tilde{V}_{110}(\chi,\eta,\phi,\vartheta) = -2\pi\sqrt{\frac{D_{0V}}{D_{0I}}}\sum_{n=1}^{\infty} n\,c_n(\chi)c_n(\eta)c_n(\phi)e_{nV}(\vartheta)\int_0^{\vartheta} e_{nV}(-\tau)\int_0^1 s_n(u)\int_0^1 c_n(v)\int_0^1 c_n(u)\times$$

$$\times g_V(u,v,w,T)\frac{\partial \tilde{V}_{i-100}(u,v,w,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\,\tau-2\pi\sqrt{\frac{D_{0V}}{D_{0I}}}\sum_{n=1}^{\infty}n\,c_n(\chi)c_n(\eta)c_n(\phi)e_{nV}(\vartheta)\times$$

$$\times\int_0^{\vartheta}e_{nV}(-\tau)\int_0^1 c_n(u)\int_0^1 s_n(v)\int_0^1 c_n(u)g_V(u,v,w,T)\frac{\partial \tilde{V}_{i-100}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau-2\pi\sqrt{\frac{D_{0V}}{D_{0I}}}\times$$

$$\times\sum_{n=1}^{\infty}n\,e_{nV}(\vartheta)\int_0^{\vartheta}e_{nV}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 s_n(u)g_V(u,v,w,T)\frac{\partial \tilde{V}_{i-100}(u,v,w,\tau)}{\partial w}d\,w\,d\,v\,d\,u\,d\,\tau\times$$

$$\times c_n(\chi)c_n(\eta)c_n(\phi)-2\sum_{n=1}^{\infty}c_n(\chi)e_{nI}(\vartheta)c_n(\eta)c_n(\phi)\int_0^{\vartheta}e_{nV}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1\left[1+\varepsilon_{I,V}\ g_{I,V}(u,v,w,T)\right]\times$$

$$\times c_n(w)\left[\tilde{I}_{100}(u,v,w,\tau)\tilde{V}_{000}(u,v,w,\tau)+\tilde{I}_{000}(u,v,w,\tau)\tilde{V}_{100}(u,v,w,\tau)\right]d\,w\,d\,v\,d\,u\,d\,\tau\,;$$

$$\tilde{I}_{101}(\chi,\eta,\phi,\vartheta)=-2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty}n\,c_n(\chi)c_n(\eta)c_n(\phi)e_{nI}(\vartheta)\int_0^{\vartheta}e_{nI}(-\tau)\int_0^1 s_n(u)\int_0^1 c_n(v)\int_0^1 g_I(u,v,w,T)\times$$

$$\times c_n(w)\frac{\partial \tilde{I}_{001}(u,v,w,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\,\tau-2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty}n\,c_n(\chi)\,c_n(\eta)\,c_n(\phi)\,e_{nI}(\vartheta)\times$$

$$\times\int_0^1 s_n(v)\int_0^1 c_n(w)g_I(u,v,w,T)\frac{\partial \tilde{I}_{001}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau-2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty}n\,e_{nI}(\vartheta)c_n(\chi)c_n(\eta)c_n(\phi)\times$$

$$\times\int_0^{\vartheta}e_{nI}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 s_n(w)g_I(u,v,w,T)\frac{\partial \tilde{I}_{001}(u,v,w,\tau)}{\partial w}d\,w\,d\,v\,d\,u\,d\,\tau-2\sum_{n=1}^{\infty}c_n(\chi)c_n(\eta)c_n(\phi)\times$$

$$\times e_{nI}(\vartheta)\int_0^{\vartheta}e_{nI}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 c_n(w)\left[1+\varepsilon_{I,V}g_{I,V}(u,v,w,T)\right]\tilde{I}_{100}(u,v,w,\tau)\,\tilde{V}_{000}(u,v,w,\tau)\,d\,w\,d\,v\,d\,u\,d\,\tau$$

$$\tilde{V}_{101}(\chi,\eta,\phi,\vartheta)=-2\pi\sqrt{\frac{D_{0V}}{D_{0I}}}\sum_{n=1}^{\infty}n\,c_n(\chi)c_n(\eta)c_n(\phi)e_{nV}(\vartheta)\int_0^{\vartheta}e_{nV}(-\tau)\int_0^1 s_n(u)\int_0^1 c_n(v)\int_0^1 g_V(u,v,w,T)\times$$

$$\times c_n(w)\frac{\partial \tilde{V}_{001}(u,v,w,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\,\tau-2\pi\sqrt{\frac{D_{0V}}{D_{0I}}}\sum_{n=1}^{\infty}n\,c_n(\chi)\,c_n(\eta)\,c_n(\phi)\,e_{nI}(\vartheta)\int_0^{\vartheta}e_{nV}(-\tau)\int_0^1 c_n(u)\times$$

$$\times\int_0^1 s_n(v)\int_0^1 c_n(w)g_I(u,v,w,T)\frac{\partial \tilde{I}_{001}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau-2\pi\sqrt{\frac{D_{0I}}{D_{0V}}}\sum_{n=1}^{\infty}n\,e_{nI}(\vartheta)c_n(\chi)c_n(\eta)c_n(\phi)\times$$

$$\times\int_0^{\vartheta} e_{nV}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 s_n(w) g_V(u,v,w,T)\frac{\partial \tilde{V}_{001}(u,v,w,\tau)}{\partial w} d\,w\,d\,v\,d\,u\,d\,\tau - 2\sum_{n=1}^{\infty} c_n(\chi)c_n(\eta)c_n(\phi)\times$$

$$\times e_{nV}(\vartheta)\int_0^{\vartheta} e_{nV}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 c_n(w)\left[1+\varepsilon_{I,V} g_{I,V}(u,v,w,T)\right]\tilde{I}_{100}(u,v,w,\tau)\,\tilde{V}_{000}(u,v,w,\tau)\,d\,w\,d\,v\,d\,u\,d\,\tau$$

;

$$\tilde{I}_{011}(\chi,\eta,\phi,\vartheta) = -2\sum_{n=1}^{\infty} c_n(\chi)c_n(\eta)c_n(\phi)e_{nI}(\vartheta)\int_0^{\vartheta} e_{nI}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 c_n(w)\left\{\tilde{I}_{000}(u,v,w,\tau)\times\right.$$

$$\left.\times\left[1+\varepsilon_{I,I} g_{I,I}(u,v,w,T)\right]\tilde{I}_{010}(u,v,w,\tau) + \left[1+\varepsilon_{I,V} g_{I,V}(u,v,w,T)\right]\tilde{I}_{001}(u,v,w,\tau)\tilde{V}_{000}(u,v,w,\tau)\right\} d\,w\,d\,v\,d\,u\,d\,\tau$$

$$\tilde{V}_{011}(\chi,\eta,\phi,\vartheta) = -2\sum_{n=1}^{\infty} c_n(\chi)c_n(\eta)c_n(\phi)e_{nV}(\vartheta)\int_0^{\vartheta} e_{nV}(-\tau)\int_0^1 c_n(u)\int_0^1 c_n(v)\int_0^1 c_n(w)\left\{\tilde{I}_{000}(u,v,w,\tau)\times\right.$$

$$\left.\times\left[1+\varepsilon_{I,I} g_{I,I}(u,v,w,T)\right]\tilde{I}_{010}(u,v,w,\tau) + \left[1+\varepsilon_{I,V} g_{I,V}(u,v,w,T)\right]\tilde{I}_{001}(u,v,w,\tau)\tilde{V}_{000}(u,v,w,\tau)\right\} d\,w\,d\,v\,d\,u\,d\,\tau$$

.

Equations for functions $\Phi_{\rho i}(x,y,z,t)$, $i \geq 0$ to describe concentrations of simplest complexes of radiation defects.

$$\frac{\partial \Phi_{I0}(x,y,z,t)}{\partial t} = D_{0\Phi I}\left[\frac{\partial^2 \Phi_{I0}(x,y,z,t)}{\partial x^2} + \frac{\partial^2 \Phi_{I0}(x,y,z,t)}{\partial y^2} + \frac{\partial^2 \Phi_{I0}(x,y,z,t)}{\partial z^2}\right] +$$

$$+ k_{I,I}(x,y,z,T) I^2(x,y,z,t) - k_I(x,y,z,T) I(x,y,z,t)$$

$$\frac{\partial \Phi_{V0}(x,y,z,t)}{\partial t} = D_{0\Phi V}\left[\frac{\partial^2 \Phi_{V0}(x,y,z,t)}{\partial x^2} + \frac{\partial^2 \Phi_{V0}(x,y,z,t)}{\partial y^2} + \frac{\partial^2 \Phi_{V0}(x,y,z,t)}{\partial z^2}\right] +$$

$$+ k_{V,V}(x,y,z,T) V^2(x,y,z,t) - k_V(x,y,z,T) V(x,y,z,t);$$

$$\frac{\partial \Phi_{Ii}(x,y,z,t)}{\partial t} = D_{0\Phi I}\left[\frac{\partial^2 \Phi_{Ii}(x,y,z,t)}{\partial x^2} + \frac{\partial^2 \Phi_{Ii}(x,y,z,t)}{\partial y^2} + \frac{\partial^2 \Phi_{Ii}(x,y,z,t)}{\partial z^2}\right] +$$

$$+ D_{0\Phi I}\left\{\frac{\partial}{\partial x}\left[g_{\Phi I}(x,y,z,T)\frac{\partial \Phi_{Ii-1}(x,y,z,t)}{\partial x}\right] + \frac{\partial}{\partial y}\left[g_{\Phi I}(x,y,z,T)\frac{\partial \Phi_{Ii-1}(x,y,z,t)}{\partial y}\right] +\right.$$

$$\left. + \frac{\partial}{\partial z}\left[g_{\Phi I}(x,y,z,T)\frac{\partial \Phi_{Ii-1}(x,y,z,t)}{\partial z}\right]\right\},\ i\geq 1,$$

$$\frac{\partial \Phi_{Vi}(x,y,z,t)}{\partial t} = D_{0\Phi V}\left[\frac{\partial^2 \Phi_{Vi}(x,y,z,t)}{\partial x^2} + \frac{\partial^2 \Phi_{Vi}(x,y,z,t)}{\partial y^2} + \frac{\partial^2 \Phi_{Vi}(x,y,z,t)}{\partial z^2}\right] +$$

$$+D_{0\Phi V}\left\{\frac{\partial}{\partial x}\left[g_{\Phi V}(x,y,z,T)\frac{\partial\Phi_{V\,i-1}(x,y,z,t)}{\partial x}\right]+\frac{\partial}{\partial y}\left[g_{\Phi V}(x,y,z,T)\frac{\partial\Phi_{V\,i-1}(x,y,z,t)}{\partial y}\right]+\right.$$

$$\left.+\frac{\partial}{\partial z}\left[g_{\Phi V}(x,y,z,T)\frac{\partial\Phi_{V\,i-1}(x,y,z,t)}{\partial z}\right]\right\},\ i\ge1;$$

Boundary and initial conditions for the functions takes the form

$$\left.\frac{\partial\Phi_{\rho i}(x,y,z,t)}{\partial x}\right|_{x=0}=0,\ \left.\frac{\partial\Phi_{\rho i}(x,y,z,t)}{\partial x}\right|_{x=L_x}=0,\ \left.\frac{\partial\Phi_{\rho i}(x,y,z,t)}{\partial y}\right|_{y=0}=0,$$

$$\left.\frac{\partial\Phi_{\rho i}(x,y,z,t)}{\partial y}\right|_{y=L_y}=0,$$

$$\left.\frac{\partial\Phi_{\rho i}(x,y,z,t)}{\partial z}\right|_{z=0}=0,\ \left.\frac{\partial\Phi_{\rho i}(x,y,z,t)}{\partial z}\right|_{z=L_z}=0,\ i\ge0;\ \Phi_{\rho 0}(x,y,z,0)=f_{\Phi\rho}(x,y,z),$$

$$\Phi_{\rho i}(x,y,z,0)=0,\ i\ge1.$$

Solutions of the above equations could be written as

$$\Phi_{\rho 0}(x,y,z,t)=\frac{1}{L_xL_yL_z}+\frac{2}{L_xL_yL_z}\sum_{n=1}^{\infty}F_{n\Phi_\rho}c_n(x)c_n(y)c_n(z)e_{n\Phi_\rho}(t)+\frac{2}{L}\sum_{n=1}^{\infty}n\,c_n(x)c_n(y)\,c_n(z)\times$$

$$\times e_{\Phi_\rho n}(t)\int_0^t e_{\Phi_\rho n}(-\tau)\int_0^{L_x}c_n(u)\int_0^{L_y}c_n(v)\int_0^{L_z}c_n(w)\left[k_{I,I}(u,v,w,T)I^2(u,v,w,\tau)-\right.$$

$$\left.-k_I(u,v,w,T)I(u,v,w,\tau)\right]d\,w\,d\,v\,d\,u\,d\tau,$$

where $F_{n\Phi_\rho}=\int_0^{L_x}c_n(u)\int_0^{L_y}c_n(v)\int_0^{L_z}c_n(w)\,f_{\Phi_\rho}(u,v,w)d\,w\,d\,v\,d\,u$,

$e_{n\Phi_\rho}(t)=exp\left[-\pi^2n^2D_{0\Phi_\rho}t\left(L_x^{-2}+L_y^{-2}+L_z^{-2}\right)\right]$, $c_n(x)=cos\,(\pi\,n\,x/L_x)$;

$$\Phi_{\rho i}(x,y,z,t)=-\frac{2\pi}{L_x^2L_yL_z}\sum_{n=1}^{\infty}n c_n(x)\,c_n(y)\,c_n(z)\,e_{\Phi_\rho n}(t)\int_0^t e_{\Phi_\rho n}(-\tau)\int_0^{L_x}s_n(u)\int_0^{L_y}c_n(v)\int_0^{L_z}g_{\Phi_\rho}(u,v,w,T)\times$$

$$\times c_n(w)\frac{\partial\Phi_{I_\rho i-1}(u,v,w,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\tau-\frac{2\pi}{L_xL_y^2L_z}\sum_{n=1}^{\infty}n c_n(x)c_n(y)c_n(z)e_{\Phi_\rho n}(t)\int_0^t e_{\Phi_\rho n}(-\tau)\times$$

$$\times\int_0^t e_{\Phi_\rho n}(-\tau)\int_0^{L_x}c_n(u)\int_0^{L_y}s_n(v)\int_0^{L_z}c_n(w)g_{\Phi_\rho}(u,v,w,T)\frac{\partial\Phi_{I_\rho i-1}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\tau-\frac{2\pi}{L_xL_yL_z^2}\sum_{n=1}^{\infty}n\times$$

$$\times e_{\Phi_\rho n}(t)\int_0^t e_{\Phi_\rho n}(-\tau)\int_0^{L_x} c_n(u)\int_0^{L_y} c_n(v)\int_0^{L_z} s_n(w)\frac{\partial \Phi_{I_\rho i-1}(u,v,w,\tau)}{\partial w}\, g_{\Phi_\rho}(u,v,w,T)\, d\,w\,d\,v\,d\,u\,d\tau \times$$

$$\times\, c_n(x)\, c_n(y)\, c_n(z),\ i \geq 1,$$

where $s_n(x) = sin\ (\pi\, n\, x/L_x)$.

Equations for the functions $C_{ij}(x,y,z,t)$ ($i \geq 0$, $j \geq 0$), boundary and initial conditions could be written as

$$\frac{\partial C_{00}(x,y,z,t)}{\partial t} = D_{0L}\frac{\partial^2 C_{00}(x,y,z,t)}{\partial x^2} + D_{0L}\frac{\partial^2 C_{00}(x,y,z,t)}{\partial y^2} + D_{0L}\frac{\partial^2 C_{00}(x,y,z,t)}{\partial z^2};$$

$$\frac{\partial C_{i0}(x,y,z,t)}{\partial t} = D_{0L}\left[\frac{\partial^2 C_{i0}(x,y,z,t)}{\partial x^2} + \frac{\partial^2 C_{i0}(x,y,z,t)}{\partial y^2} + \frac{\partial^2 C_{i0}(x,y,z,t)}{\partial z^2}\right] +$$

$$+ D_{0L}\frac{\partial}{\partial x}\left[g_L(x,y,z,T)\frac{\partial C_{i-10}(x,y,z,t)}{\partial x}\right] + D_{0L}\frac{\partial}{\partial y}\left[g_L(x,y,z,T)\frac{\partial C_{i-10}(x,y,z,t)}{\partial y}\right] +$$

$$+ D_{0L}\frac{\partial}{\partial z}\left[g_L(x,y,z,T)\frac{\partial C_{i-10}(x,y,z,t)}{\partial z}\right],\ i \geq 1;$$

$$\frac{\partial C_{01}(x,y,z,t)}{\partial t} = D_{0L}\frac{\partial^2 C_{01}(x,y,z,t)}{\partial x^2} + D_{0L}\frac{\partial^2 C_{01}(x,y,z,t)}{\partial y^2} + D_{0L}\frac{\partial^2 C_{01}(x,y,z,t)}{\partial z^2} +$$

$$+ D_{0L}\frac{\partial}{\partial x}\left[\frac{C_{00}^{\gamma}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{00}(x,y,z,t)}{\partial x}\right] + D_{0L}\frac{\partial}{\partial y}\left[\frac{C_{00}^{\gamma}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{00}(x,y,z,t)}{\partial y}\right] +$$

$$+ D_{0L}\frac{\partial}{\partial z}\left[\frac{C_{00}^{\gamma}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{00}(x,y,z,t)}{\partial z}\right];$$

$$\frac{\partial C_{02}(x,y,z,t)}{\partial t} = D_{0L}\frac{\partial^2 C_{02}(x,y,z,t)}{\partial x^2} + D_{0L}\frac{\partial^2 C_{02}(x,y,z,t)}{\partial y^2} + D_{0L}\frac{\partial^2 C_{02}(x,y,z,t)}{\partial z^2} +$$

$$+ D_{0L}\left\{\frac{\partial}{\partial x}\left[C_{01}(x,y,z,t)\frac{C_{00}^{\gamma-1}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{00}(x,y,z,t)}{\partial x}\right] + \frac{\partial}{\partial y}\left[C_{01}(x,y,z,t)\frac{C_{00}^{\gamma-1}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\times\right.\right.$$

$$\left.\left.\times\frac{\partial C_{00}(x,y,z,t)}{\partial y}\right] + \frac{\partial}{\partial z}\left[C_{01}(x,y,z,t)\frac{C_{00}^{\gamma-1}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{00}(x,y,z,t)}{\partial z}\right]\right\} +$$

$$\left.\left.\times\frac{\partial C_{00}(x,y,z,t)}{\partial y}\right] + \frac{\partial}{\partial z}\left[C_{01}(x,y,z,t)\frac{C_{00}^{\gamma-1}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{00}(x,y,z,t)}{\partial z}\right]\right\} + D_{0L}\left\{\frac{\partial}{\partial x}\left[\frac{C_{00}^{\gamma}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\times\right.\right.$$

$$\times\frac{\partial C_{01}(x,y,z,t)}{\partial x}\Bigg]+\frac{\partial}{\partial y}\left[\frac{C_{00}^{\gamma}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{01}(x,y,z,t)}{\partial y}\right]+\frac{\partial}{\partial z}\left[\frac{C_{00}^{\gamma}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{01}(x,y,z,t)}{\partial z}\right]\Bigg]\Bigg\}$$

;

$$\frac{\partial C_{11}(x,y,z,t)}{\partial t}=D_{0L}\frac{\partial^2 C_{11}(x,y,z,t)}{\partial x^2}+D_{0L}\frac{\partial^2 C_{11}(x,y,z,t)}{\partial y^2}+D_{0L}\frac{\partial^2 C_{11}(x,y,z,t)}{\partial z^2}+$$

$$+\left\{\frac{\partial}{\partial x}\left[C_{10}(x,y,z,t)\frac{C_{00}^{\gamma-1}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{00}(x,y,z,t)}{\partial x}\right]+\frac{\partial}{\partial y}\left[C_{10}(x,y,z,t)\frac{C_{00}^{\gamma-1}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\times\right.\right.$$

$$\left.\left.\times\frac{\partial C_{00}(x,y,z,t)}{\partial y}\right]+\frac{\partial}{\partial z}\left[C_{10}(x,y,z,t)\frac{C_{00}^{\gamma-1}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{00}(x,y,z,t)}{\partial z}\right]\right\}D_{0L}+$$

$$+D_{0L}\left\{\frac{\partial}{\partial x}\left[\frac{C_{00}^{\gamma}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{10}(x,y,z,t)}{\partial x}\right]+\frac{\partial}{\partial y}\left[\frac{C_{00}^{\gamma}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{10}(x,y,z,t)}{\partial y}\right]+\right.$$

$$\left.+\frac{\partial}{\partial z}\left[\frac{C_{00}^{\gamma}(x,y,z,t)}{P^{\gamma}(x,y,z,T)}\frac{\partial C_{10}(x,y,z,t)}{\partial z}\right]\right\}+D_{0L}\left\{\frac{\partial}{\partial x}\left[g_L(x,y,z,T)\frac{\partial C_{01}(x,y,z,t)}{\partial x}\right]+\right.$$

$$\left.+\frac{\partial}{\partial y}\left[g_L(x,y,z,T)\frac{\partial C_{01}(x,y,z,t)}{\partial y}\right]+\frac{\partial}{\partial z}\left[g_L(x,y,z,T)\frac{\partial C_{01}(x,y,z,t)}{\partial z}\right]\right\};$$

$$\left.\frac{\partial C_{ij}(x,y,z,t)}{\partial x}\right|_{x=0}=0,\ \left.\frac{\partial C_{ij}(x,y,z,t)}{\partial x}\right|_{x=L_x}=0,\ \left.\frac{\partial C_{ij}(x,y,z,t)}{\partial y}\right|_{y=0}=0,$$

$$\left.\frac{\partial C_{ij}(x,y,z,t)}{\partial y}\right|_{y=L_y}=0,$$

$$\left.\frac{\partial C_{ij}(x,y,z,t)}{\partial z}\right|_{z=0}=0,\ \left.\frac{\partial C_{ij}(x,y,z,t)}{\partial z}\right|_{z=L_z}=0,\ i\geq 0,\ j\geq 0;$$

$$C_{00}(x,y,z,0)=f_C(x,y,z),\ C_{ij}(x,y,z,0)=0,\ i\geq 1,\ j\geq 1.$$

Functions $C_{ij}(x,y,z,t)$ ($i\geq 0$, $j\geq 0$) could be approximated by the following series during solutions of the above equations

$$C_{00}(x,y,z,t)=\frac{F_{0C}}{L_xL_yL_z}+\frac{2}{L_xL_yL_z}\sum_{n=1}^{\infty}F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t).$$

Here $$e_{nC}(t)=exp\left[-\pi^2n^2D_{0C}t\left(\frac{1}{L_x^2}+\frac{1}{L_y^2}+\frac{1}{L_z^2}\right)\right],$$

$$F_{nC}=\int_0^{L_x}c_n(u)\int_0^{L_y}c_n(v)\int_0^{L_z}f_C(u,v,w)\,c_n(w)\,d\,w\,d\,v\,d\,u;$$

$$C_{i0}(x,y,z,t)=-\frac{2\pi}{L_x^2 L_y L_z}\sum_{n=1}^{\infty} n F_{nC} c_n(x) c_n(y) c_n(z) e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x} s_n(u)\int_0^{L_y} c_n(v)\int_0^{L_z} g_L(u,v,w,T)\times$$

$$\times c_n(w)\frac{\partial C_{i-10}(u,v,w,\tau)}{\partial u} d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_x L_y^2 L_z}\sum_{n=1}^{\infty} n F_{nC} c_n(x) c_n(y) c_n(z) e_{nC}(t)\int_0^t e_{nC}(-\tau)\times$$

$$\times\int_0^{L_x} c_n(u)\int_0^{L_y} s_n(v)\int_0^{L_z} c_n(v) g_L(u,v,w,T)\frac{\partial C_{i-10}(u,v,w,\tau)}{\partial v} d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_x L_y L_z^2}\sum_{n=1}^{\infty} n F_{nC} e_{nC}(t)\times$$

$$\times c_n(x) c_n(y) c_n(z)\int_0^t e_{nC}(-\tau)\int_0^{L_x} c_n(u)\int_0^{L_y} c_n(v)\int_0^{L_z} s_n(v) g_L(u,v,w,T)\frac{\partial C_{i-10}(u,v,w,\tau)}{\partial w} d\,w\,d\,v\,d\,u\,d\,\tau$$

$$,\ i\geq 1;$$

$$C_{01}(x,y,z,t)=-\frac{2\pi}{L_x^2 L_y L_z}\sum_{n=1}^{\infty} n F_{nC} c_n(x) c_n(y) c_n(z) e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x} s_n(u)\int_0^{L_y} c_n(v)\int_0^{L_z} c_n(w)\times$$

$$\times\frac{C_{00}^{\gamma}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial u} d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_x L_y^2 L_z}\sum_{n=1}^{\infty} n F_{nC} c_n(x) c_n(y) c_n(z) e_{nC}(t)\times$$

$$\times\int_0^t e_{nC}(-\tau)\int_0^{L_x} c_n(u)\int_0^{L_y} s_n(v)\int_0^{L_z} c_n(w)\frac{C_{00}^{\gamma}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial v} d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_x L_y L_z^2}\sum_{n=1}^{\infty} n\, e_{nC}(t)\times$$

$$\times F_{nC} c_n(x) c_n(y) c_n(z)\int_0^t e_{nC}(-\tau)\int_0^{L_x} c_n(u)\int_0^{L_y} c_n(v)\int_0^{L_z} s_n(w)\frac{C_{00}^{\gamma}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial w} d\,w\,d\,v\,d\,u\,d\,\tau$$

$$;$$

$$C_{02}(x,y,z,t)=-\frac{2\pi}{L_x^2 L_y L_z}\sum_{n=1}^{\infty} n F_{nC} c_n(x) c_n(y) c_n(z) e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x} s_n(u)\int_0^{L_y} c_n(v)\int_0^{L_z} c_n(w)\times$$

$$\times C_{01}(u,v,w,\tau)\frac{C_{00}^{\gamma-1}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial u} d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_x L_y^2 L_z}\sum_{n=1}^{\infty} F_{nC} c_n(x) c_n(y)\times$$

$$\times n c_n(z) e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x} c_n(u)\int_0^{L_y} s_n(v)\int_0^{L_z} C_{01}(u,v,w,\tau)\frac{C_{00}^{\gamma-1}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial v}\times$$

$$\times c_n(w) d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_x L_y L_z^2}\sum_{n=1}^{\infty} n F_{nC} c_n(x) c_n(y) c_n(z) e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x} c_n(u)\int_0^{L_y} c_n(v)\times$$

$$\times\int_0^{L_z} s_n(w) C_{01}(u,v,w,\tau)\frac{C_{00}^{\gamma-1}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial w} d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_x^2 L_y L_z}\sum_{n=1}^{\infty} n\, c_n(x)\times$$

$$\times F_{nC}c_n(y)c_n(z)e_{nC}(t)\int\limits_0^t e_{nC}(-\tau)\int\limits_0^{L_x} s_n(u)\int\limits_0^{L_y} c_n(v)\int\limits_0^{L_z} c_n(w)C_{01}(u,v,w,\tau)\frac{\partial C_{00}(u,v,w,\tau)}{\partial u}\times$$

$$\times\frac{C_{00}^{\gamma-1}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_xL_y^2L_z}\sum_{n=1}^{\infty}n\,F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int\limits_0^t e_{nC}(-\tau)\int\limits_0^{L_x} c_n(u)\times$$

$$\times\int\limits_0^{L_y} s_n(v)\int\limits_0^{L_z} c_n(w)\,C_{01}(u,v,w,\tau)\frac{C_{00}^{\gamma-1}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_xL_yL_z^2}\sum_{n=1}^{\infty}n\times$$

$$\times F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int\limits_0^t e_{nC}(-\tau)\int\limits_0^{L_x} c_n(u)\int\limits_0^{L_y} c_n(v)\int\limits_0^{L_z} s_n(w)C_{01}(u,v,w,\tau)\frac{C_{00}^{\gamma-1}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\times$$

$$\times\frac{\partial C_{00}(u,v,w,\tau)}{\partial w}d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_x^2L_yL_z}\sum_{n=1}^{\infty}F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int\limits_0^t e_{nC}(-\tau)\int\limits_0^{L_x} s_n(u)\times$$

$$\times n\int\limits_0^{L_y} c_n(v)\int\limits_0^{L_z} c_n(w)\frac{C_{00}^{\gamma}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{01}(u,v,w,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_xL_y^2L_z}\sum_{n=1}^{\infty}c_n(x)e_{nC}(t)\times$$

$$\times F_{nC}c_n(y)\int\limits_0^t e_{nC}(-\tau)\int\limits_0^{L_x} c_n(u)\int\limits_0^{L_y} s_n(v)\int\limits_0^{L_z} c_n(w)\frac{C_{00}^{\gamma}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{01}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau\times$$

$$\times n\,c_n(z)-\frac{2\pi}{L_xL_yL_z^2}\sum_{n=1}^{\infty}n\,F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int\limits_0^t e_{nC}(-\tau)\int\limits_0^{L_x} c_n(u)\int\limits_0^{L_y} c_n(v)\int\limits_0^{L_z} s_n(w)\times$$

$$\times\frac{C_{00}^{\gamma}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{01}(u,v,w,\tau)}{\partial w}d\,w\,d\,v\,d\,u\,d\,\tau\,;$$

$$C_{11}(x,y,z,t)=-\frac{2\pi}{L_x^2L_yL_z}\sum_{n=1}^{\infty}n\,F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int\limits_0^t e_{nC}(-\tau)\int\limits_0^{L_x} s_n(u)\int\limits_0^{L_y} c_n(v)\int\limits_0^{L_z} c_n(w)\times$$

$$\times g_L(u,v,w,T)\frac{\partial C_{01}(u,v,w,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_xL_y^2L_z}\sum_{n=1}^{\infty}n\,F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\times$$

$$\times\int\limits_0^t e_{nC}(-\tau)\int\limits_0^{L_x} c_n(u)\int\limits_0^{L_y} s_n(v)\int\limits_0^{L_z} c_n(w)g_L(u,v,w,T)\frac{\partial C_{01}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_xL_yL_z^2}\times$$

$$\times\sum_{n=1}^{\infty}n\,e_{nC}(t)\int\limits_0^t e_{nC}(-\tau)\int\limits_0^{L_x} c_n(u)\int\limits_0^{L_y} c_n(v)\int\limits_0^{L_z} s_n(w)g_L(u,v,w,T)\frac{\partial C_{01}(u,v,w,\tau)}{\partial w}d\,w\,d\,v\,d\,u\,d\,\tau\times$$

$$\times F_{nC}c_n(x)c_n(y)c_n(z)-\frac{2\pi}{L_x^2L_yL_z}\sum_{n=1}^{\infty}F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x}s_n(u)\int_0^{L_y}c_n(v)\times$$

$$\times n\int_0^{L_z}c_n(w)\frac{C_{00}^{\gamma}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{10}(u,v,w,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_xL_y^2L_z}\sum_{n=1}^{\infty}n\,F_{nC}c_n(x)c_n(y)\times$$

$$\times c_n(z)e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x}c_n(u)\int_0^{L_y}s_n(v)\int_0^{L_z}c_n(w)\frac{C_{00}^{\gamma}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{10}(u,v,w,\tau)}{\partial v}d\,w\,d\,v\,d\,u\,d\,\tau-$$

$$-\frac{2\pi}{L_xL_yL_z^2}\sum_{n=1}^{\infty}n\,F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x}c_n(u)\int_0^{L_y}c_n(v)\int_0^{L_z}s_n(w)\frac{C_{00}^{\gamma}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\times$$

$$\times\frac{\partial C_{10}(u,v,w,\tau)}{\partial w}d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_x^2L_yL_z}\sum_{n=1}^{\infty}n\,F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x}s_n(u)\times$$

$$\times\int_0^{L_y}c_n(v)\int_0^{L_z}c_n(w)C_{10}(u,v,w,\tau)\frac{C_{00}^{\gamma-1}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial u}d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_xL_y^2L_z}\sum_{n=1}^{\infty}n\times$$

$$\times F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x}c_n(u)\int_0^{L_y}s_n(v)\int_0^{L_z}c_n(w)\frac{C_{00}^{\gamma-1}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial v}\times$$

$$\times C_{10}(u,v,w,\tau)d\,w\,d\,v\,d\,u\,d\,\tau-\frac{2\pi}{L_xL_yL_z^2}\sum_{n=1}^{\infty}n\,F_{nC}c_n(x)c_n(y)c_n(z)e_{nC}(t)\int_0^t e_{nC}(-\tau)\int_0^{L_x}c_n(u)\times$$

$$\times\int_0^{L_y}c_n(v)\int_0^{L_z}s_n(w)C_{10}(u,v,w,\tau)\frac{C_{00}^{\gamma-1}(u,v,w,\tau)}{P^{\gamma}(u,v,w,T)}\frac{\partial C_{00}(u,v,w,\tau)}{\partial w}d\,w\,d\,v\,d\,u\,d\,\tau$$