Here

$$N_C(p^2) \;=\; \int_{m_\pi}^{\sqrt{p^2}} dm\; \rho_h(m)\;, \tag{71}$$

and in analogy to (53), $T_C(p^2)$ is a "life-time" factor giving the probability that a cluster of mass $m_C^2 = p^2$ decays within a time interval t in the laboratory frame,

$$T_C(p^2) \;=\; 1 \;-\; \exp\left[-\frac{t}{\tau_C(p^2)}\right]\;, \tag{72}$$

where in this case we simply take $\tau_C(p^2) = E_C/p^2 = \gamma/m_C$ from the uncertainty principle. In order to find the value for the decay probability (70) for a given cluster of mass m_C, we sum over the possible decays for this cluster according to the particle data tables. The probability for a specific 2-body decay mode is taken to be a product of a flavor, a spin and a kinematical factor [38],

$$\Gamma_{C\rightarrow h_1 h_2}(m_C; m_1, m_2) \;:=\; P_m(m_C, m_1+m_2)\; P_s(j_1, j_2)\; P_k(m_C, m_1, m_2)\;, \tag{73}$$

where $j_{1,2}$ ($m_{1,2}$) are the angular momenta (masses) of the two hadrons $h_{1,2}$. The factor

$$P_m(m_C, m_1+m_2) \;=\; \left(1+\frac{m_1^2+m_2^2}{m_c^2}\right)\sqrt{1-\frac{(m_1+m_2)^2}{M_c^2}}\;\theta(m_C-m_1-m_2) \tag{74}$$

is the two-body phase-space suppression function for the decay. The spin factor

$$P_s(j_1, j_2) \;=\; (2j_1+1)\;(2j_2+1) \tag{75}$$

takes into account the spin degeneracy with the allowed spins j_1 and j_2 of the two hadrons. The kinematic factor

$$P_k(m_C, m_1, m_2) \;=\; \frac{\sqrt{\lambda(m_C^2, m_1^2, m_2^2)}}{m_C^2} \tag{76}$$

is the two-body phase-space factor, where $\lambda(a,b,c) = a^2+b^2+c^2-2\,(ab+ac+bc)$.

Thus, with the decay probability $\Gamma_{C\rightarrow h}$ of (70) evaluated in this fashion, the terms involving the $\hat{D}$ and $\hat{E}$ operators in the kinetic equations (48) and (49) can be expressed as

$$\begin{aligned}
\hat{D}_\chi^U\, F_\chi &= F_\chi(r; x, p_\perp^2, p^2)\int dp'^{\,2}\,\Gamma_{\chi\rightarrow U}(p^2, p'^{\,2})\\
\hat{E}_\chi^h\, F_\chi &= F_\chi(r; x, p_\perp^2, p^2)\int dp'^{\,2}\,\Gamma_{\chi\rightarrow h}(p^2, p'^{\,2})\\
\hat{D'}_\chi^U\, F_\chi &= \int dp'^{\,2} dp_\perp'^2 \frac{dx'}{x'} F_\chi(r; x, p_\perp'^2, p'^{\,2})\;\Gamma_{\chi\rightarrow U}(p'^{\,2}, p^2)\\
\hat{E'}_U^h\, F_U &= F_U(r; x, p_\perp^2, p^2)\int dp'^{\,2}\,\Gamma_{U\rightarrow h}(p^2, p'^{\,2})
\end{aligned} \tag{77}$$