

A master equation approach to nonlinear optics

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Corrigendum

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McNeil K J and Walls D F 1974 *J. Phys. A: Math., Nucl. Gen.* 7 617-31

On page 624 equation (5.10) should read

$$A_{2n} = -\sqrt{\pi(4n-1)} \sum_{l=n}^{\infty} \rho_{2l}(0) \frac{(2l)!}{2^{2l}(l-n)!\Gamma(n+l+\frac{1}{2})}. \quad (5.10)$$

On pages 627, 628 equations (6.4) to (6.6) should be replaced by

$$\bar{\rho}_n(s) = \frac{n!(N_0 - n_S^0)!}{(N_0 - n)!n_S^0!} \left(\prod_{j=n_S^0}^n (s + h_j) \right)^{-1}, \quad n_S^0 \leq n \leq N_0 \quad (6.4)$$

where

$$h_j = (j+1)(N_0 - j).$$

$\bar{\rho}_n(s) = 0$ otherwise. Let

$$M = \begin{cases} \frac{1}{2}N_0, & N_0 \text{ even} \\ \frac{1}{2}(N_0 - 1), & N_0 \text{ odd.} \end{cases} \quad (6.5)$$

Then if $n_S^0 \geq M$ we obtain repeated factors among the $(s + h_j)$ in (6.4) when $n \geq M$. The most convenient way to take these repeated factors into account is to rewrite (6.4):

$$\bar{\rho}_n(s) = \begin{cases} \frac{n!(N_0 - n_S^0)!}{(N_0 - n)!n_S^0!} \left(\prod_{j=n_S^0}^n (s + h_j) \right)^{-1}, & n \leq M-1 \\ \frac{n!(N_0 - n_S^0)!}{(N_0 - n)!n_S^0!} \left(\prod_{j=n_S^0}^{M-1} (s + h_j) \prod_{k=M}^n (s + h_k) \right)^{-1}, & n \geq M \text{ and } n_S^0 \leq M. \end{cases} \quad (6.6)$$

Inversion of (6.6) (using convolutions where necessary) yields

$$\rho_n(\tau) = \begin{cases} \frac{n!(N_0 - n_S^0)!}{(N_0 - n)!n_S^0!} \sum_{j=n_S^0}^n A_j^{n_S^0, n} \exp(-h_j\tau), & n \leq M-1 \\ \frac{n!(N_0 - n_S^0)!}{(N_0 - n)!n_S^0!} \sum_{j=n_S^0}^{M-1} \sum_{k=M}^n A_j^{n_S^0, M-1} A_k^{M, n} \\ \times \{ (1 - \delta_{h_j, h_k}) [\exp(-h_j\tau) - \exp(-h_k\tau)] / (h_k - h_j) \\ + \delta_{h_j, h_k} \tau \exp(-h_j\tau) \} & n \geq M \text{ and } n_S^0 \leq M \end{cases} \quad (6.7)$$

where the $A_j^{m, n}$ are the appropriate coefficients in the partial fraction expansions of the denominator products in (6.6), ie

$$A_j^{m, n} = \left(\prod_{\substack{i=m \\ i \neq j}}^n (h_i - h_j) \right)^{-1} \quad (6.8)$$

On page 629 equation (7.2) should read

$$\frac{d\langle n^2 \rangle}{d\tau} = -4\langle n^3 \rangle + 8\langle n^2 \rangle - 4\langle n \rangle. \quad (7.2)$$

Equation (7.3) should read

$$\langle n(\tau) \rangle \simeq [\langle n(0) \rangle + (1 - \langle n(0) \rangle) e^{-\tau}]^{-1} \langle n(0) \rangle. \quad (7.3)$$

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