An ideal optical notch filter will extinguish all of the terms in Eq. (24) for which $l+m+n=0$, i.e.,

$$u_D(t)=\sqrt{P_c}\,e^{j\omega_c t}\sum_{\substack{l\quad m\quad n\\(l+m+n\neq 0)}}\sum\sum J_l(m_1)J_m(m_2)J_n(m_0)e^{j(l\Omega_1+m\Omega_2+n\Omega_0)t} \tag{25}$$

The detected photocurrent is then given by

$$i(t)=R|u_D(t)|^2 \tag{26}$$

$$=RP_c\sum_{\substack{l\quad m\quad n\\(l+m+n\neq 0)}}\sum\sum\;\sum_{\substack{p\quad q\quad r\\(p+q+r\neq 0)}}\sum\sum J_l(m_1)J_m(m_2)J_n(m_0)J_p(m_1)J_q(m_2)J_r(m_0) \times e^{j[(l-p)\Omega_1+(m-q)\Omega_2+(n-r)\Omega_0]t} \tag{27}$$

Expanding Eq. (27) up to fifth-order in m_1 and m_2, and retaining only the downconverted in-band products and DC terms, we find

$$i(t)=RP_c\Big\{\Big[\Phi_0(m_0)+\Phi_2(m_0)(m_1^2+m_2^2)+\Phi_4(m_0)(m_1^4+4m_1^2m_2^2+m_2^4)\Big] \tag{28}$$

$$+\Big[\Phi_1(m_0)m_1+\Phi_3(m_0)(m_1^3+2m_1m_2^2)+\Phi_5(m_0)(m_1^5+6m_1^3m_2^2+3m_1m_2^4)\Big]\cos(\Omega_{10}t) \tag{29}$$

$$+\Big[\Phi_3(m_0)m_1^2m_2+\Phi_5(3m_1^2m_2^3+2m_1^4m_2)\Big]\cos((2\Omega_{10}-\Omega_{20})t) \tag{30}$$

$$+\;\Phi_5(m_0)m_1^3m_2^2\cos((3\Omega_{10}-2\Omega_{20})t) \tag{31}$$

$$+\;\text{similar terms at }\Omega_{20},(2\Omega_{20}-\Omega_{10})\text{ and }(3\Omega_{20}-2\Omega_{10})\Big\}$$

where $\Omega_{ij}\equiv(\Omega_i-\Omega_j)$ and the coefficients $\Phi_n(m_0)$ are tabulated below:

$\Phi_0(m_0)$	$1-J_0^2(m_0)$
$\Phi_1(m_0)$	$2J_0(m_0)J_1(m_0)$
$\Phi_2(m_0)$	$\frac{1}{2}\left[J_0^2(m_0)-J_1^2(m_0)\right]$
$\Phi_3(m_0)$	$-\frac{1}{4}\left[3J_0(m_0)J_1(m_0)-J_1(m_0)J_2(m_0)\right]$
$\Phi_4(m_0)$	$-\frac{1}{32}\left[3J_0^2(m_0)-4J_1^2(m_0)+J_2^2(m_0)\right]$
$\Phi_5(m_0)$	$\frac{1}{96}\left[10J_0(m_0)J_1(m_0)-5J_1(m_0)J_2(m_0)+J_0(m_0)J_1(m_0)\right]$

(32)

We note that the linearization condition given by Eq. (18) is equivalent to requiring $\Phi_3(m_0)=0$, which eliminates not only the third-order IMD products in Eq. (30), but also the cubic contribution to the fundamental tones in Eq. (29).

Equation (31) indicates that there will be fifth-order intermodulation products present at the downconverted frequency $3\Omega_{10}-2\Omega_{20}$. For clarity, these terms were not plotted in Fig. 5, because for $m_1=m_2$ they are always smaller than the dominant IMD3 contributions at $2\Omega_{10}-\Omega_{20}$ for small input signals ($m_1,m_2<<1$).

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