Alternative series and Stokes' transformation

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Table 1: Fourier coefficients for $f(t)$ and $f'(t)$

$f(t)=\frac{1}{2}a_0+\sum_{n=1}^{\infty}\{a_n cos(\frac{n\pi t}{l})+b_n sin(\frac{n\pi t}{l})\}$	a_0	a_n	b_n
$f'(t)=\frac{1}{2}a'_0+\sum_{n=1}^{\infty}\{a'_n cos(\frac{n\pi t}{l})+b'_n sin(\frac{n\pi t}{l})\}$	a'_0	a'_n	b'_n

relation of a_n, b_n, a'_n and b'_n:

$$a_n = -\frac{1}{n\pi}\sum_{k=1}^{m} J_k sin(\frac{n\pi t_k}{l}) - \frac{l}{n\pi}b'_n,\ n \neq 0 \tag{1}$$

$$b_n = \frac{1}{n\pi}\sum_{k=1}^{m} J_k cos(\frac{n\pi t_k}{p}) + \frac{l}{n\pi}a'_n,\ n \neq 0 \tag{2}$$

relation of a_0 and a'_0 ?

a'_0 by alternative series

$$a'_0 = \frac{1}{l}\int_0 l f'(t)dt = \frac{1}{l}f(t)\mid_{-l}^{0} + \frac{1}{l}f(t)\mid_0^l = \frac{2}{l}\{q-p\}$$