NEW FORMULA 4.132.1

The original formula is

$$\int_0^\infty \frac{\sin ax \, \sinh \beta x}{e^{\gamma x}-1}\,dx = -\frac{a}{2(a^2+\beta^2)} + \frac{\pi}{2\gamma}\frac{\sinh \frac{2\pi a}{\gamma}}{\cosh \frac{2\pi a}{\gamma} - \cos \frac{2\pi \beta}{\gamma}} + \frac{i}{2\gamma}\left[\psi\left(\frac{\beta}{\gamma}+i\frac{a}{\gamma}+1\right) - \psi\left(\frac{\beta}{\gamma}-i\frac{a}{\gamma}+1\right)\right]$$

the change of variable $t = \gamma x$ and replacing a/γ by a and β/γ by b gives the new form

$$\int_0^\infty \frac{\sin ax \, \sinh bx}{e^{x}-1}\,dx = -\frac{a}{2(a^2+b^2)} + \frac{\pi}{2}\frac{\sinh 2\pi a}{\cosh 2\pi a - \cos 2\pi b} + \frac{i}{2}\left[\psi\left(b+ia+1\right) - \psi\left(b-ia+1\right)\right]$$