! For an efficient use of these tables, first read `HowTo.pdf`.

T2.60A. Integrands involving product and quotient of trigonometric and hyperbolic functions on the interval $(0, \pi/2)$ and $(0, \pi)$.

1. $$\int_0^{\pi/2} \cos^{2m} x \, \cosh \beta x \, dx = \frac{(2m)! \sinh \frac{\pi\beta}{2}}{\beta(\beta^2+2^2)\dots[\beta^2+(2m)^2]}, \quad \Re\{\beta\} > 0.$$

2. $$\int_0^{\pi/2} \cos^{2m-1} x \, \cosh \beta x \, dx = \frac{(2m-1)! \cosh \frac{\pi\beta}{2}}{(\beta^2+1^2)(\beta^2+3^2)\dots[\beta^2+(2m+1)^2]}, \quad \Re\{\beta\} > 0.$$

3. $$\int_0^{\pi/2} \frac{\cos ax \, \sinh(2b \cos x)}{\sqrt{\cos x}} \, dx = \frac{\pi}{2}\sqrt{\pi b}\, I_{\alpha/2+1/4}(b)\, I_{-a/2+1/4}(b), \quad a > 0.$$

4. $$\int_0^{\pi/2} \frac{\cos ax \, \cosh(2b \cos x)}{\sqrt{\cos x}} \, dx = \frac{\pi}{2}\sqrt{\pi b}\, I_{a/2-1/4}(b)\, I_{-a/2-1/4}(b), \quad a > 0.$$

5. $$\int_0^{\pi/2} \frac{\sin(2a \cos^2 x) \cosh(a \sin 2x)}{b^2 \cos^2 x + c^2 \sin^2 x} \, dx = \frac{\pi}{2bc} \sin \frac{2ac}{b+c}, \quad b > 0,\ c > 0.$$

6. $$\int_0^{\pi/2} \frac{\cos(2a \cos^2 x) \cosh(a \sin 2x)}{b^2 \cos^2 x + c^2 \sin^2 x} \, dx = \frac{\pi}{2bc} \cos \frac{2ac}{b+c}, \quad b > 0,\ c > 0.$$

7. $$\int_0^{\pi/2} \cos(a \sin x) \cosh(\beta \cos x) \, dx = \frac{\pi}{2} J_0(\sqrt{a^2-\beta^2}).$$

8. $$\int_0^{\pi/2} \sin^{\nu} x \, \sinh(\beta \cos x) \, dx = \frac{\sqrt{\pi}}{2}\left(\frac{2}{\beta}\right)^{\nu/2} \Gamma\left(\frac{\nu+1}{2}\right) \mathbf{L}_{\nu/2}(\beta), \quad \Re\{\nu\} > -1.$$

9. $$\int_0^{\pi/2} \frac{dx}{\cosh(\tan x) \cos x \sqrt{\sin 2x}} = \sqrt{2\pi} \sum_{k=0}^{\infty} \frac{(-1)^k}{\sqrt{2k+1}}.$$

10. $$\int_0^{\pi/2} \frac{\tan^q x}{\cosh(\tan x) + \cos\lambda} \frac{dx}{\sin 2x} = \frac{\Gamma(q)}{\sin\lambda} \sum_{k=1}^{\infty} (-1)^{k-1} \frac{\sin k\lambda}{k^q}, \quad q > 0.$$

11. $$\int_0^{\pi} \sin^{\nu} x \cosh(\beta \cos x)\, dx = \sqrt{\pi} \left(\frac{2}{\beta}\right)^{\nu/2} \Gamma\left(\frac{\nu+1}{2}\right) I_{\nu/2}(\beta), \quad \Re\{\nu\} > -1.$$
