

## PARAMETRISIERUNG

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\sin \alpha = 2 \sin \frac{\alpha}{2} \cos \frac{\alpha}{2}$$

$$= \frac{2 \sin \frac{\alpha}{2} \cos \frac{\alpha}{2}}{\cos^2 \frac{\alpha}{2} + \sin^2 \frac{\alpha}{2}}$$

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$$= \frac{2 \operatorname{tg} \frac{\alpha}{2}}{1 + \operatorname{tg}^2 \frac{\alpha}{2}}$$

$$\begin{aligned} \cos^2 \frac{\alpha}{2} &\neq 0 \\ \cos \frac{\alpha}{2} &\neq 0 \\ \frac{\alpha}{2} &\neq \frac{\pi}{2} + k\pi \\ \alpha &\neq \pi + 2k\pi \end{aligned}$$

$$\operatorname{tg} \frac{\alpha}{2} = t$$

$$\sin \alpha = \frac{2t}{1+t^2}$$

$$\cos 2\alpha = \cos^2 \alpha - \sin^2 \alpha$$

$$\begin{aligned}\cos \alpha &= \frac{\cos^2 \frac{\alpha}{2} - \sin^2 \frac{\alpha}{2}}{\cos^2 \frac{\alpha}{2} + \sin^2 \frac{\alpha}{2}} \\ &= \frac{\frac{\cos^2 \frac{\alpha}{2}}{\cos^2 \frac{\alpha}{2}} - \frac{\sin^2 \frac{\alpha}{2}}{\cos^2 \frac{\alpha}{2}}}{\frac{\cos^2 \frac{\alpha}{2}}{\cos^2 \frac{\alpha}{2}} + \frac{\sin^2 \frac{\alpha}{2}}{\cos^2 \frac{\alpha}{2}}} \\ &= \frac{1 - \tan^2 \frac{\alpha}{2}}{1 + \tan^2 \frac{\alpha}{2}}\end{aligned}$$

$$\cos \alpha = \frac{1 - t^2}{1 + t^2}$$