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Problem: If $(a^2-b^2)\sin x+2ab\cos x=(a^2+b^2)$, find $\tan x$.

Solution: Divide both sides by (a^2+b^2), we get $\frac{(a^2-b^2)}{(a^2+b^2)}\sin x+\frac{2ab}{(a^2+b^2)}\cos x=1$.

$\Rightarrow \cos y\sin x+\sin y\cos x=1$ where $\cos y=\frac{(a^2-b^2)}{(a^2+b^2)}$ and $\sin y=\frac{2ab}{(a^2+b^2)}$ -----(1)

$\Rightarrow \sin(x+y)=1$; $(x+y)=\frac{\pi}{2}$ and hence $x=\frac{\pi}{2}-y$.

Thus $\tan x=\tan\left(\frac{\pi}{2}-y\right)=\cot y=\frac{a^2-b^2}{2ab}$ using (1).