I believe Section 5.14 in Kinsler’s Fundamental Of Acoustics would help but im not sure. But here is the problem:

A fluid is rotating with a velocity of $v=Ωxr=Ωr\hat{θ}$, and $\frac{dc}{dp}=β>0$, where β is a constant and c is the speed of sound and $ρ$ is the density. When can a ray of sound move in a closed circle?