

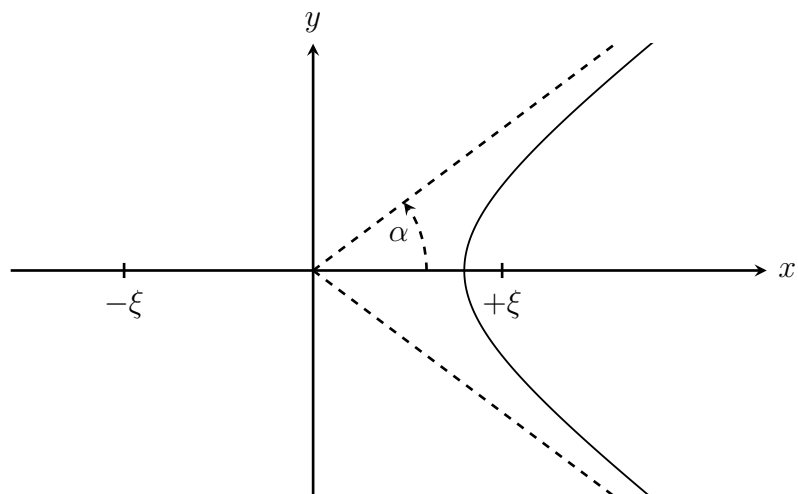
Radio Navigation and Radar

3. Exercise

Prof. Dr.-Ing. habil. Tobias Weber

June 19, 2020
Universität Rostock

1. Problem



A two dimensional scenario is considered. For simplicity, the coordinates are chosen such that the two fixed points lie on the x -axis at $-\xi$ and $+\xi$. Show that the positions

(x, y) of constant range difference Δr lie on a hyperbola

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1!$$

Determine the parameters a and b of the hyperbola as functions of ξ and Δr ! Determine the angle α of the asymptote as a function of ξ and Δr !

2. Problem

In the following localization using the time difference of arrival method in a two dimensional scenario with three fixed points is considered. Determine the coordinates x and y of the mobile terminal as functions of the coordinates of the fixed points and the two independent range differences which can be measured in the aforementioned scenario! For simplicity, you may assume that one of the fixed points is at the origin.