

[mex111] **Separatrix tangent lines at hyperbolic point**

Consider a particle of mass m moving along the x -axis under the influence of a conservative force described by a potential energy function $V(x)$ which has a smooth maximum at $x = \bar{x}$ with curvature $|V''(\bar{x})| = k$.

(a) Find the slope of the tangent lines to the separatrix at the resulting hyperbolic fixed point $(\bar{x}, 0)$ in the (x, \dot{x}) -plane.

(b) Calculate the time it takes the particle to move between two points x_1 and x_2 very close to the hyperbolic point $(x = \bar{x}, \dot{x} = 0)$ on the separatrix.