$$(1 - b^2u^2 - \tfrac{\alpha}{E}u) = b^2(u_0 - u)(u - u_1)$$

$$u_0 = \frac{\frac{\alpha}{E} - \sqrt{\frac{\alpha^2}{E^2} + 4b^2}}{-2b^2} \qquad u_1 = \frac{+\frac{\alpha}{E} + \sqrt{\frac{\alpha^2}{E^2} + 4b^2}}{-2b^2}$$

$$u_0 > 0 \qquad\qquad u_1 < 0$$

$$\int \frac{dx}{\sqrt{\alpha + \beta x + \gamma x^2}} = \frac{1}{\sqrt{-\gamma}} \cos^{-1}\left(-\frac{\beta + 2\gamma x}{\sqrt{\beta^2 - 4\alpha\gamma}}\right)$$

$$\gamma = -1 \qquad \beta = u_0 + u_1 \qquad \alpha = -u_0 u_1$$

$$\theta = -\pi + \frac{2b}{b} \int_0^{u_0} \frac{du}{\sqrt{(u_0 - u)(u - u_1)}}$$

$$= -\pi + 2 \cos^{-1}\left(-\frac{(u_0 + u_1) - 2x}{\sqrt{(u_0 + u_1)^2 - 4u_0u_1}}\right)\Bigg|_0^{u_0}$$

$$= -\pi + 2\cos^{-1}\left(-\frac{(-u_0 + u_1)}{\sqrt{(u_0 - u_1)^2}}\right) - \cos^{-1}\left(-\frac{(u_0 + u_1)}{\sqrt{(u_0 - u_1)^2}}\right)$$

$$u_0 > u_1 \Rightarrow \theta = -\pi + 2\cos^{-1}(+1) - 2\cos^{-1} - \frac{u_0 + u_1}{u_0 - u_1}$$

$$= \pi - 2\cos^{-1}\left(\frac{\alpha}{E b^2 \sqrt{\frac{\alpha^2}{E^2} + 4b^2}/b^2}\right)$$

$$\Rightarrow \cos\left(\frac{\pi}{2} - \frac{\theta}{2}\right) = \frac{\frac{\alpha}{E}}{\sqrt{\frac{\alpha^2}{E^2} + 4b^2}}$$

$$\Rightarrow b = \frac{\alpha}{2E}\cot\frac{\theta}{2} \Rightarrow \sigma(\theta) = \frac{\kappa^2}{4\sin^4\frac{\theta}{2}}$$

$$\kappa = \frac{\alpha}{m v^2}$$

same result as for attractive potential