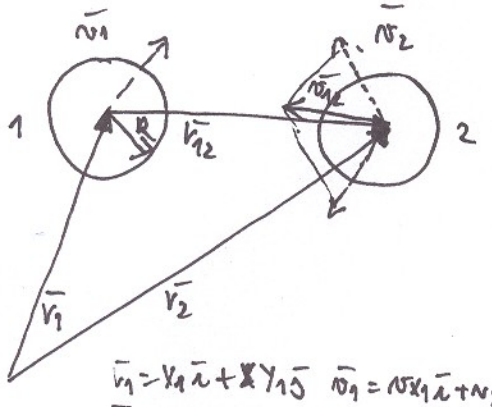
Tuhé gule

1/ Zrážka



$\bar{r}_1 = X_1\bar{i} + Y_1\bar{j}$ $\quad \bar{v}_1 = v_{x1}\bar{i} + v_{y1}\bar{j}$

$\bar{r}_2 = X_2\bar{i} + Y_2\bar{j}$ $\quad \bar{v}_2 = v_{x2}\bar{i} + v_{y2}\bar{j}$

a) nájdem čas zrážky

$\bar{r}_{12} = \bar{r}_2 - \bar{r}_1$

$\bar{v}_{12} = \bar{v}_2 - \bar{v}_1$

$b = \bar{r}_{12} \cdot \bar{v}_{12}$

ak $b < 0$

$D = b^2 - |v_{12}|^2 \left(|r_{12}|^2 - 4R^2\right)$

ak $D > 0$

$T_z = \left(-b - \sqrt{D}\right) / |v_{12}|^2$

$\Delta t = T_z$

b) posun v čase

$X_1 = X_1 + v_{x1}\Delta t$

$Y_1 = Y_1 + v_{y1}\Delta t$

$X_2 = X_2 + v_{x2}\Delta t$

$Y_2 = Y_2 + v_{y2}\Delta t$

$\bar{r}_{12} = \bar{r}_2 - \bar{r}_1$; $\bar{v}_{12} = \bar{v}_2 - \bar{v}_1$

ak $\left(|r_{12}|^2 - 4R^2\right) \leq 0$

c) odraz

$b = \bar{r}_{12} \cdot \bar{v}_{12}$

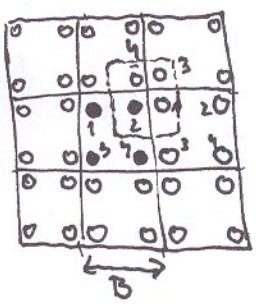
$v_{xx} = b\, X_{12} / |r_{12}|^2$

$v_{yy} = b\, Y_{12} / |r_{12}|^2$

$\left.\begin{array}{l} v_{x1} = v_{x1} + v_{xx} \\ v_{y1} = v_{y1} + v_{yy} \end{array}\right\} \bar{v}_1 = \bar{v}_1 + \bar{v}''$

$\left.\begin{array}{l} v_{x2} = v_{x2} - v_{xx} \\ v_{y2} = v_{y2} - v_{yy} \end{array}\right\} \bar{v}_2 = \bar{v}_2 - \bar{v}''$

Minimum image convention



$X_{12} = X_2 - X_1$

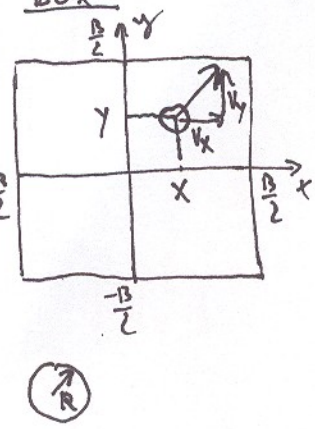
$Y_{12} = Y_2 - Y_1$

$X_{12} = X_{12} - B^* \mathrm{ANINT}\left(\frac{X_{12}}{B}\right)$

$Y_{12} = Y_{12} - B^* \mathrm{ANINT}\left(\frac{Y_{12}}{B}\right)$

zaokrávli na celé číslo

Box



a) nájdem čas zrážky

ak $v_x > 0$ $\quad T_z = \dfrac{\frac{B}{2} - R - X}{v_x}$

inak $T_z = \dfrac{-\frac{B}{2} + R - X}{v_x}$

ak $v_y > 0$ $\quad T_z = \dfrac{\frac{B}{2} - R - Y}{v_y}$

inak $T_z = \dfrac{-\frac{B}{2} + R - Y}{v_y}$

b) posun v čase

$X = X + v_x T_z$

$Y = Y + v_y T_z$

c) odraz od steny

ak $|X| \geq \left(\frac{B}{2} - R\right)$ $\quad v_x = -v_x$

$|Y| \geq \left(\frac{B}{2} - R\right)$ $\quad v_y = -v_y$

Hodnoty - rymy shež volajáke rozumné