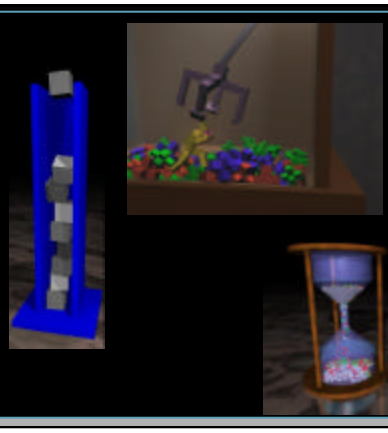

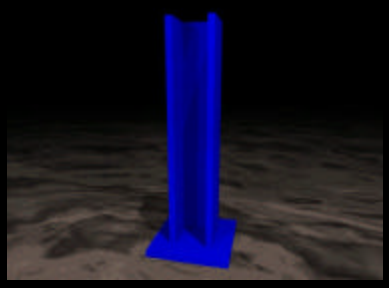

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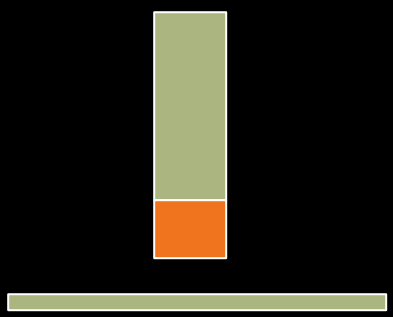

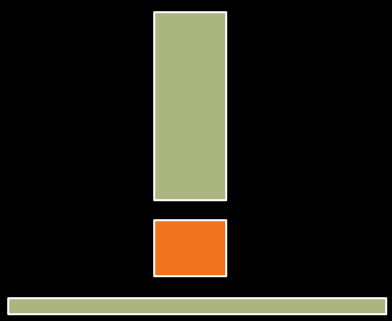

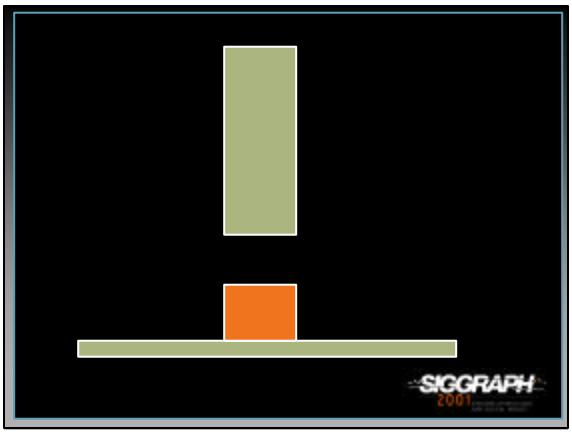

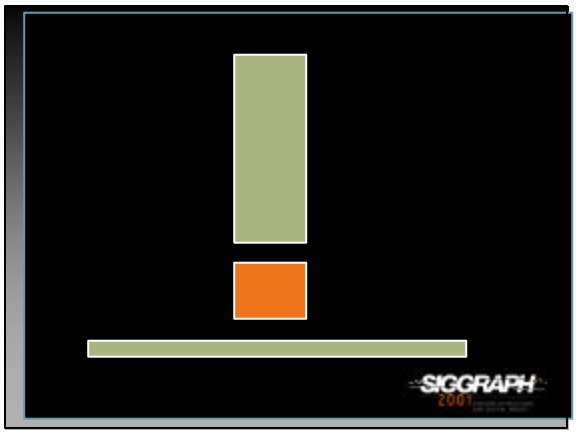

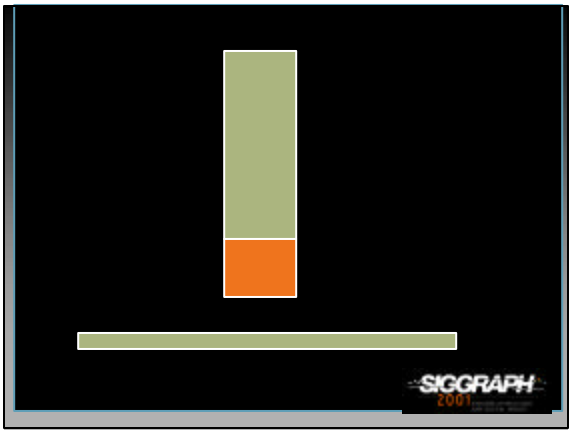

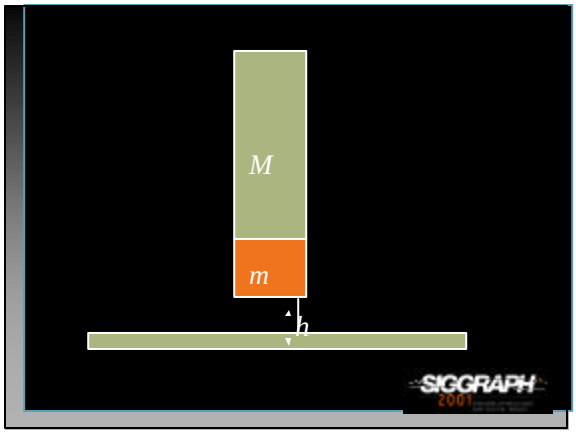

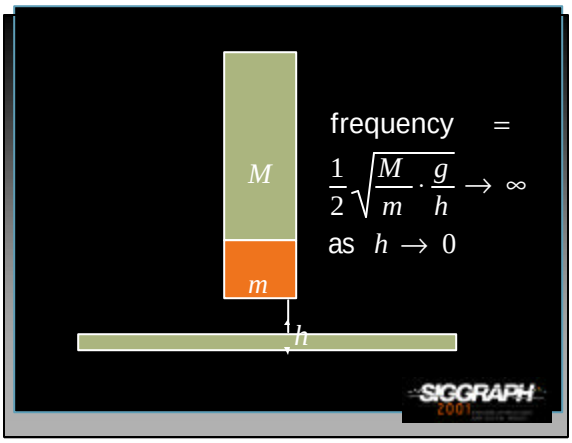

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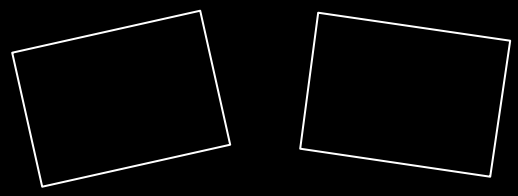
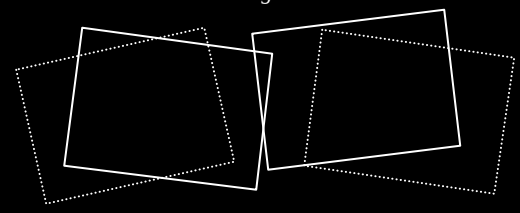
$\bar{x}_{current}$

$\bar{r}_{current}$



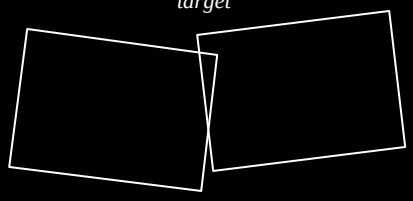
$+ \Delta\bar{x}_{target}$

$+ \Delta\bar{r}_{target}$



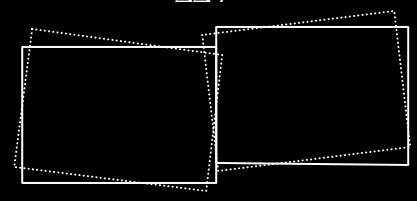
$= \bar{x}_{target}$

$= \bar{r}_{target}$



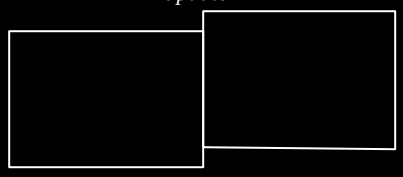
$- \Delta\Delta\,\bar{x}$

$- \Delta\Delta\,\bar{r}$



$= \bar{x}_{update}$

$= \bar{r}_{update}$

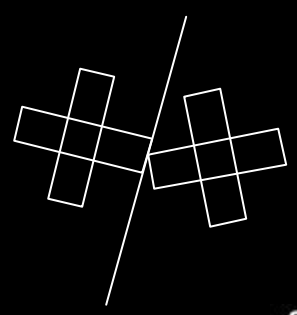


Kinetic energy:

$$\sum_{i=1}^{k} \frac{1}{2} m_i \bar{v}_i \cdot \bar{v}_i + \frac{1}{2} \bar{w}_i^T I_i \bar{w}_i$$

"Distance" to target:

$$\sum_{i=1}^{k} \frac{1}{2} m_i \Delta\Delta\,\bar{x}_i \cdot \Delta\Delta\,\bar{x}_i + \frac{1}{2} \Delta\Delta\,\bar{r}_i^T I_i \Delta\Delta\,\bar{r}_i$$



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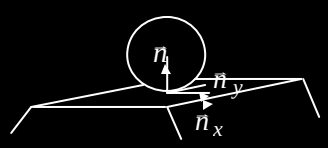
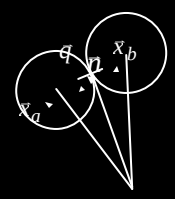


$$v(\vec{q}) = \vec{n} \cdot ((\vec{v}_b + \vec{w}_b \times (\vec{q} - \vec{x}_b)) - (\vec{v}_a + \vec{w}_a \times (\vec{q} - \vec{x}_a)))$$



Before the impulse: v^-
After the impulse: v^+

Collision law: $v^- \geq 0 : v^+ \geq 0$

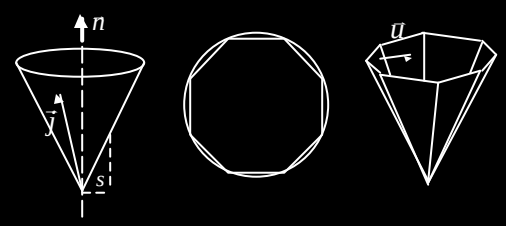
$v^- < 0 : v^+ \geq -e \cdot v^-$

Baraff, SIGGRAPH 89.

$\vec{n} \cdot \vec{j} \geq 0,$

$(\vec{n}_x \cdot \vec{j})^2 + (\vec{n}_y \cdot \vec{j})^2 \leq m^2 (\vec{n} \cdot \vec{j})^2.$

Note: this is the inside of a cone and convex but non-linear.



$$\vec{j} \cdot \vec{u}_h \geq 0;\ h = 0,1,\ldots,7;$$

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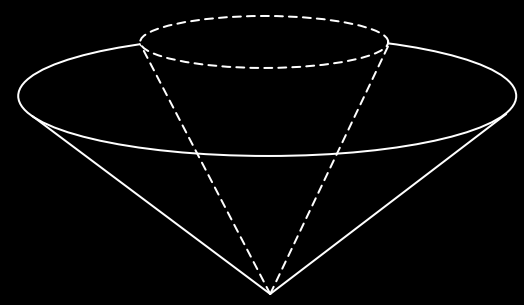
$$\sum_{i=1}^{k} -m_i \vec{g} \cdot \vec{a}_i + \frac{1}{2} m_i \vec{a}_i \cdot \vec{a}_i + \frac{1}{2} \vec{\alpha}_i^T I_i \vec{\alpha}_i$$

$$n \cdot a(q) \geq 0$$



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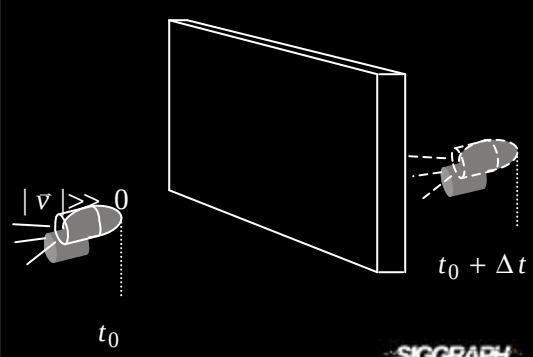
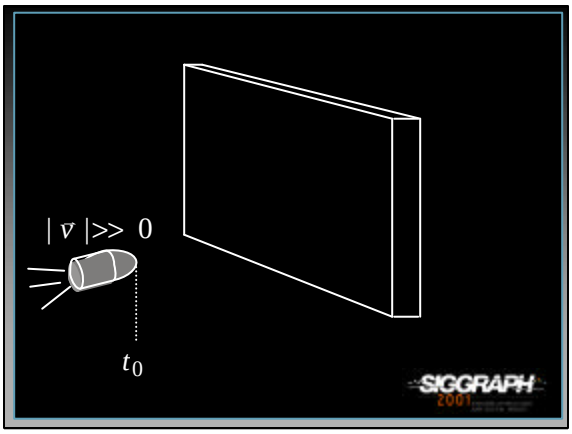
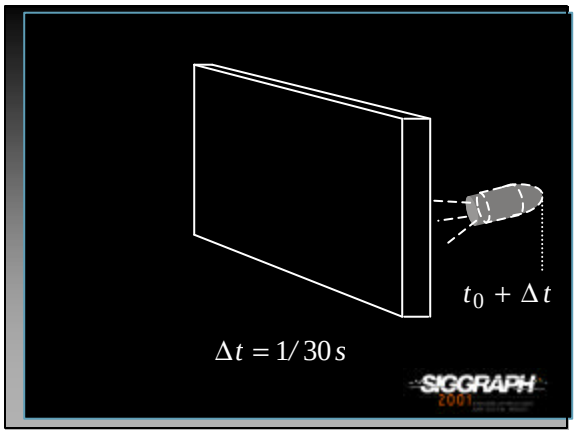
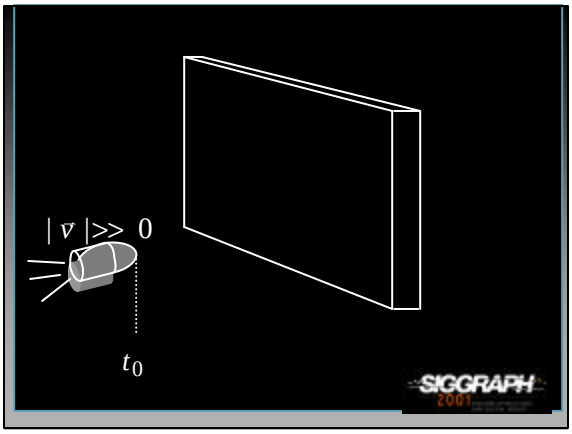
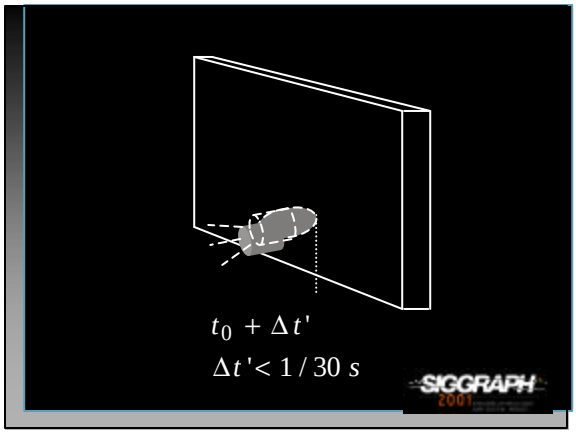
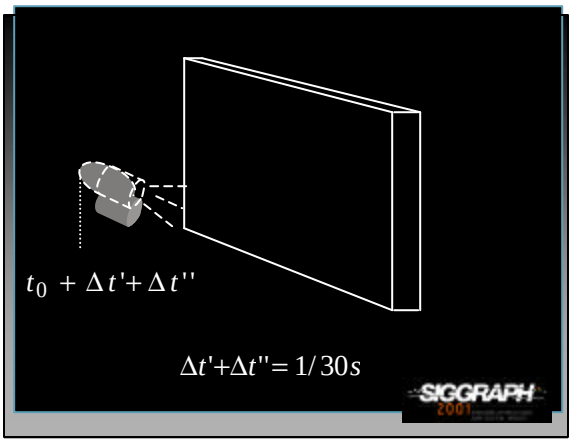


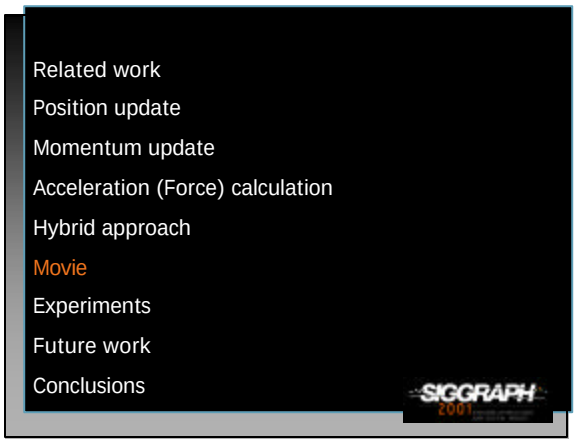

$|v| >> 0$
t_0
SIGGRAPH 2001


$t_0 + \Delta t$
$\Delta t = 1/30\,s$
SIGGRAPH 2001


$|v| >> 0$
t_0
SIGGRAPH 2001


$t_0 + \Delta t'$
$\Delta t' < 1/30\ s$
SIGGRAPH 2001


$t_0 + \Delta t' + \Delta t''$
$\Delta t' + \Delta t'' = 1/30s$
SIGGRAPH 2001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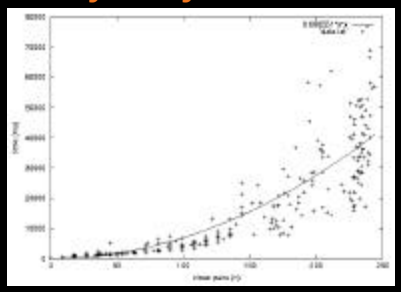

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