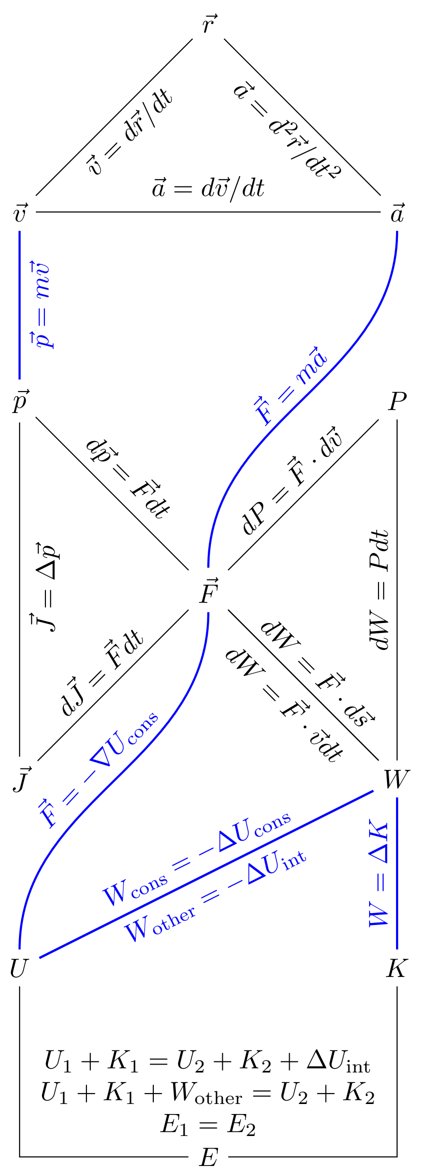
Kinematics Motion Concept Maps

TCB

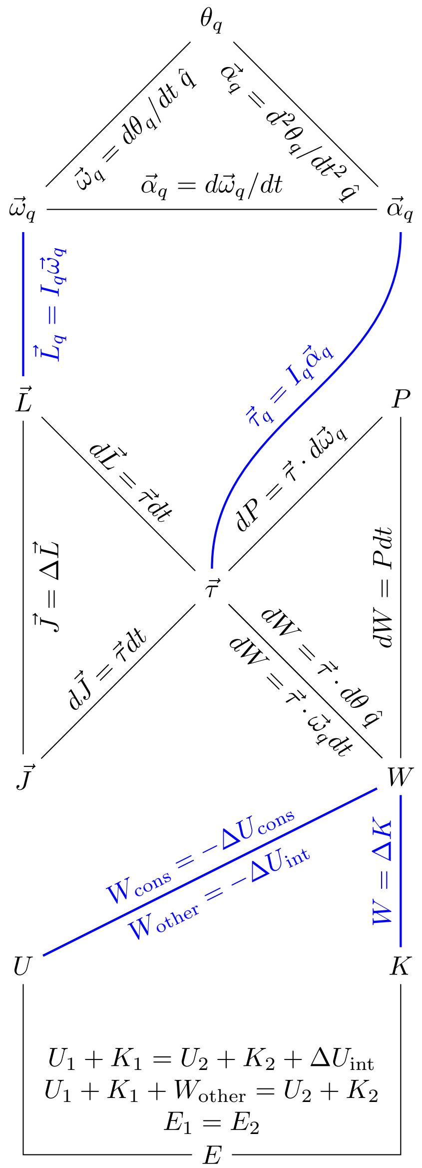
January 3, 2020

Translational



t	time
$\vec{r}$	position
$\vec{v}$	velocity
$\vec{a}$	acceleration
m	mass
$\vec{p}$	momentum
$\vec{F}$	force
P	power
$\vec{J}$	impulse
W	work
U	potential energy
K	kinetic energy
U_{cons}	potential due to conservative interactions
W_{cons}	work done by conservative interactions
U_{int}	internal energy
W_{other}	work done by interactions not accounted for explicitly
E	total energy
q	generic variable for discussion of operations
Δq	difference between final and initial values of q ($\Delta q \equiv q_{\text{final}} - q_{\text{initial}}$)
dq	differential element q
$\vec{q}_1 \cdot \vec{q}_2$	scalar (dot) product between q_1 and q_2 ($\vec{q}_1 \cdot \vec{q}_2 = \lvert\vec{q}_1\rvert\lvert\vec{q}_2\rvert \cos(\phi_{1,2})$)
∇q	gradient of the scalar q

Rotational



t	time
θ_q	angular position around axis q
$\vec{\omega}_q$	angular velocity around axis q
$\vec{\alpha}_q$	angular acceleration around axis q
I_q	moment of inertia about axis q
$\vec{L}$	angular momentum
$\vec{\tau}$	torque
P	power
$\vec{J}$	impulse
W	work
U	potential energy
K	kinetic energy
U_{cons}	potential due to conservative interactions
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q	generic variable for discussion of operations
Δq	difference between final and initial values of q ($\Delta q \equiv q_{\mathrm{final}} - q_{\mathrm{initial}}$)
dq	differential element q
$\hat{n}$	unit normal vector to the plane defined by q_1 and q_2; direction defined by right-hand rule
$\vec{q}_1 \cdot \vec{q}_2$	scalar (dot) product between q_1 and q_2 ($\vec{q}_1 \cdot \vec{q}_2 = \|\vec{q}_1\|\|\vec{q}_2\| \cos(\phi_{1,2})$)
$\vec{q}_1 \times \vec{q}_2$	vector product between q_1 and q_2 ($\vec{q}_1 \times \vec{q}_2 = \|\vec{q}_1\|\|\vec{q}_2\| \sin(\phi_{1,2})\ \hat{n}$)