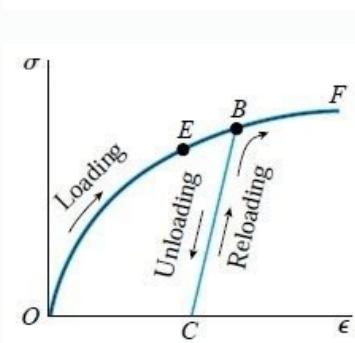
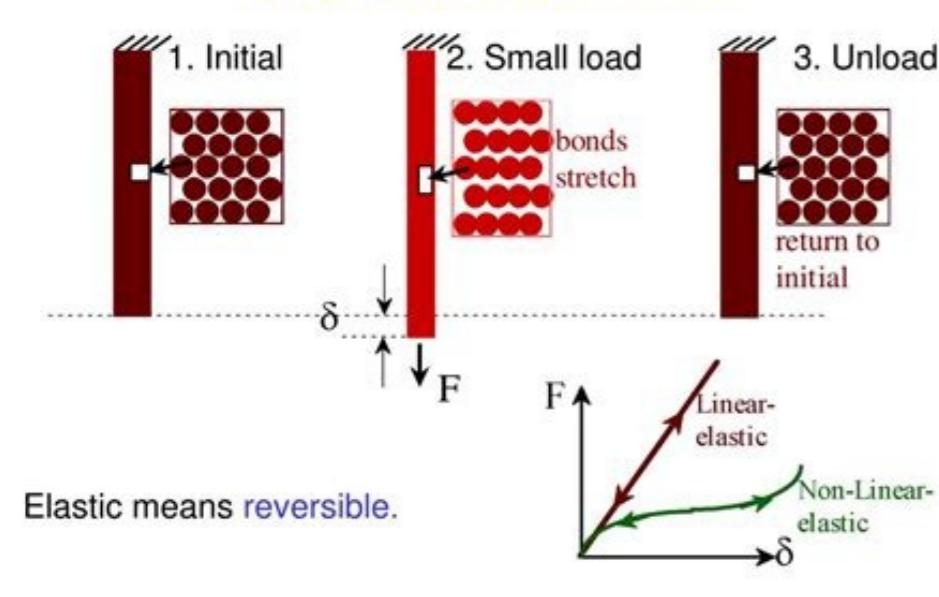
**Next**

Difference between elastic and inelastic deformation

Elastic Deformation



Elastic vs. Inelastic Collisions

Physicists divide collisions into several categories :

Completely Inelastic: bodies stick together
KE not conserved

Partially Inelastic : bodies separate
KE not conserved

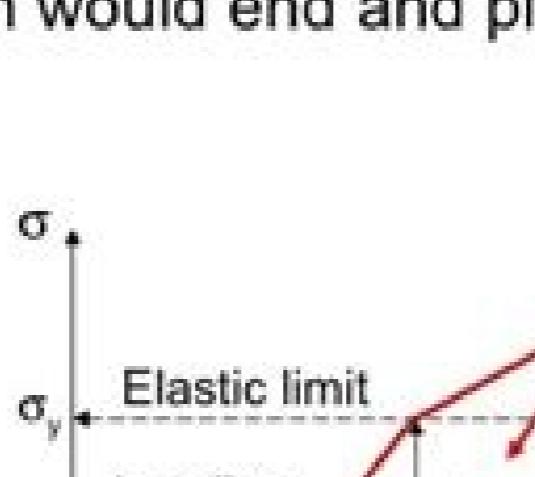
Elastic : bodies separate
KE is conserved

Completely inelastic collisions are easy to solve: just use conservation of momentum.

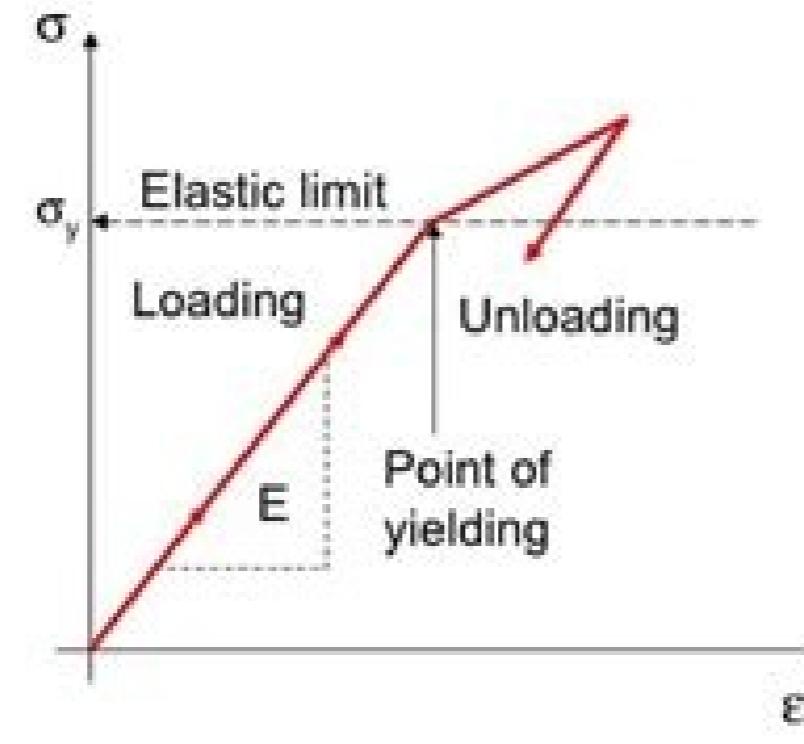
Elastic collisions — which occur when hard, rigid objects like marbles or billiard balls collide — take more work. One must use both

and conservation of momentum
conservation of energy

Plasticity

- If the loading is increased, it will reach a certain limit whereby elastic deformation would end and plastic deformation would start
 - This limit is known as the ***elastic limit*** and beyond this point the material is said to have ***yielded***
 - The loading is thus beyond the elastic limit
 - Permanent or irreversible deformation
 - Stress corresponding to yielding is called the ***yield strength***, denoted by σ_y

The graph illustrates the mechanical behavior of a material under stress. The vertical axis is labeled σ (stress) and the horizontal axis is unlabeled. A straight line starts from the origin (0,0) and slopes upwards to the right, representing the loading path. This line is labeled 'Loading' and has a slope labeled 'E'. The point where the loading path begins to deviate from the linear elastic behavior is marked as the 'Point of yielding'. At this point, a vertical dashed line extends down to the horizontal axis, marking the yield stress σ_y . The segment of the curve above the point of yielding is labeled 'Unloading'. The unloading path follows a curved path back towards the horizontal axis, indicating that the material does not return to its original state after yielding.



Distinctions Between Collisions

- Elastic Collision – Objects maintain their original shape and are not deformed after colliding.
 - Inelastic Collision – Objects are deformed during the collision and lose kinetic energy.
 - Perfectly Inelastic Collision – Objects join together after a collision to form one mass.

