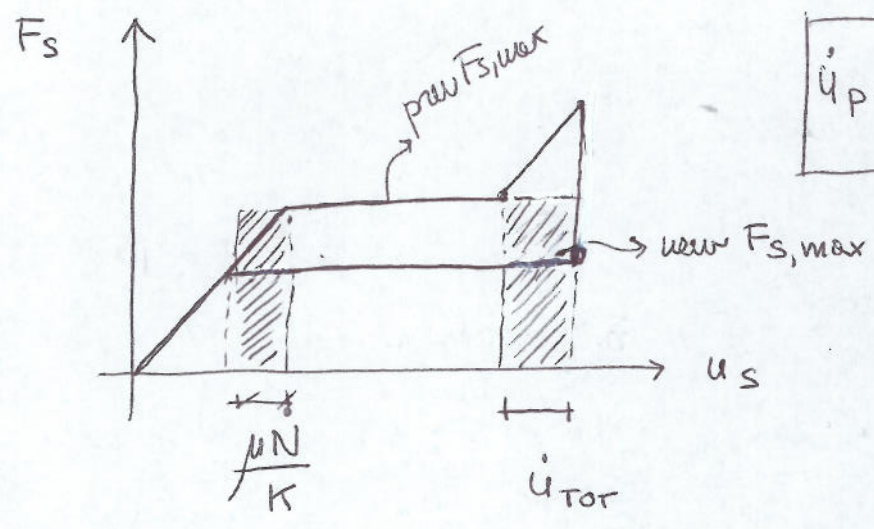


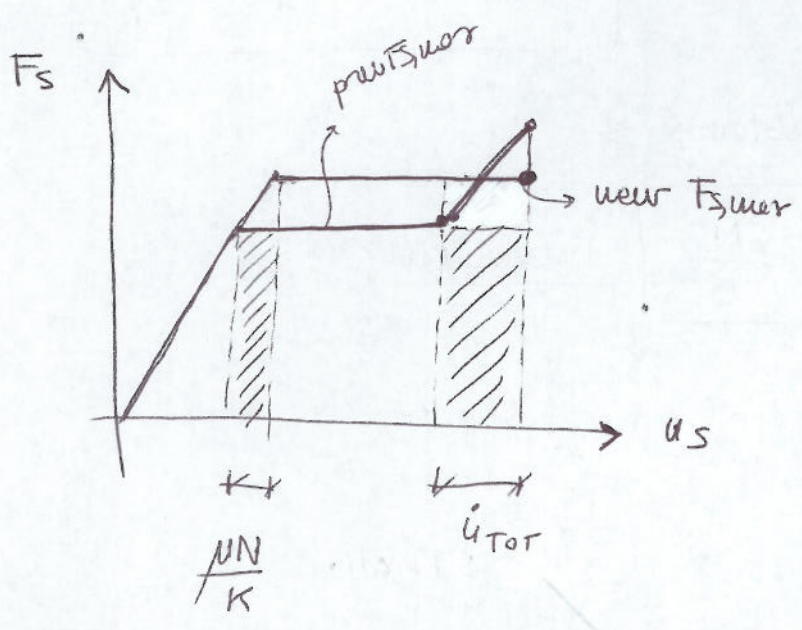
2 case) if $\dot{N} < 0$ (unloading)



$$\dot{u}_p = \dot{u}_{TOT} - \frac{\mu \dot{N}}{K}$$

→ here it is positive

3 case) if $\dot{N} > 0$ (loading)



$$\dot{u}_p = \dot{u}_{TOT} - \frac{\mu \dot{N}}{K}$$

→ negative contribution

BTW: To get the energy dissipated due to friction, I would take $(\dot{u}_{TOT} \times F_{s,max,prev})$ plus the contribution you see above given by the way N increases/decreases.