

1.033/1.57

Mechanics of Material Systems
(Mechanics and Durability of Solids I)

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Lecture: MWF1 // Recitation: F3:00-4:30

Part IV: Plasticity and Yield Design

7. 1D-Plasticity – An Energy Approach

Content 1.033/1.57

Part I. **Deformation and Strain**

- 1 Description of Finite Deformation
- 2 Infinitesimal Deformation

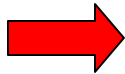
Part II. **Momentum Balance and Stresses**

- 3 Momentum Balance
- 4 Stress States / Failure Criterion

Part III. **Elasticity and Elasticity Bounds**

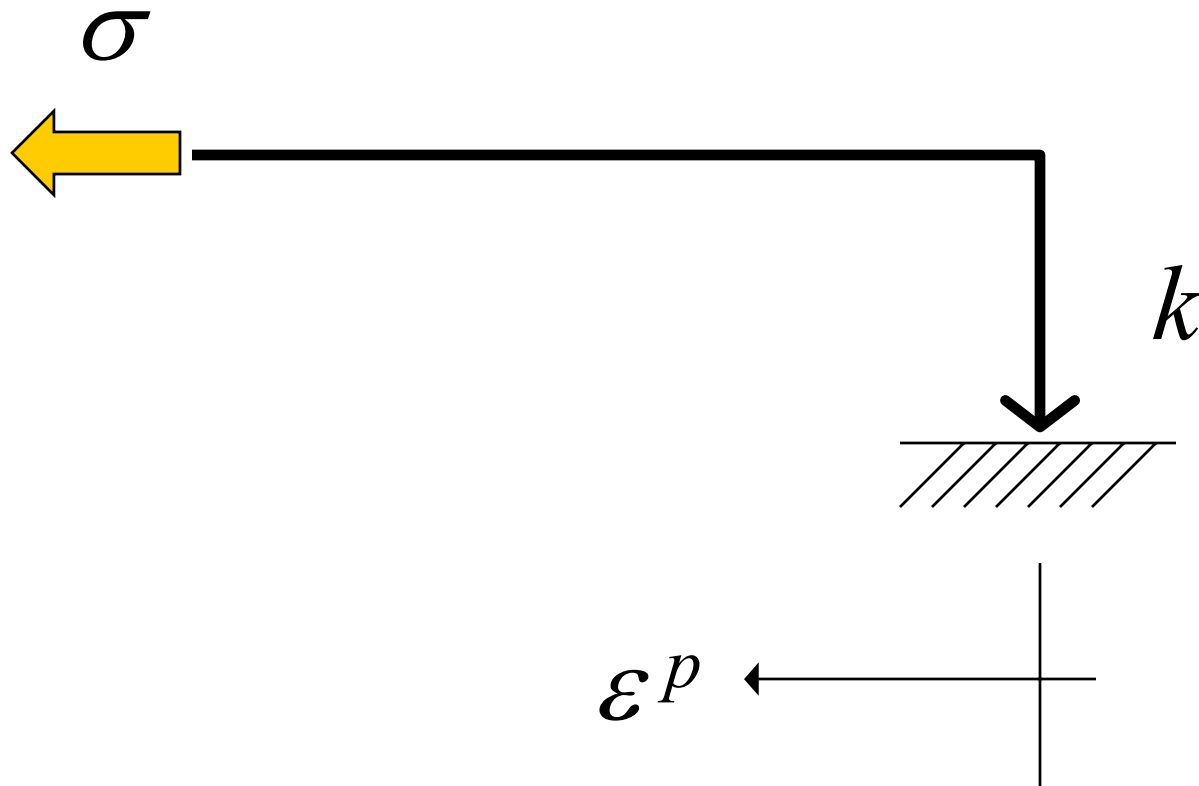
- 5 Thermoelasticity,
- 6 Variational Methods

Part IV. **Plasticity and Yield Design**

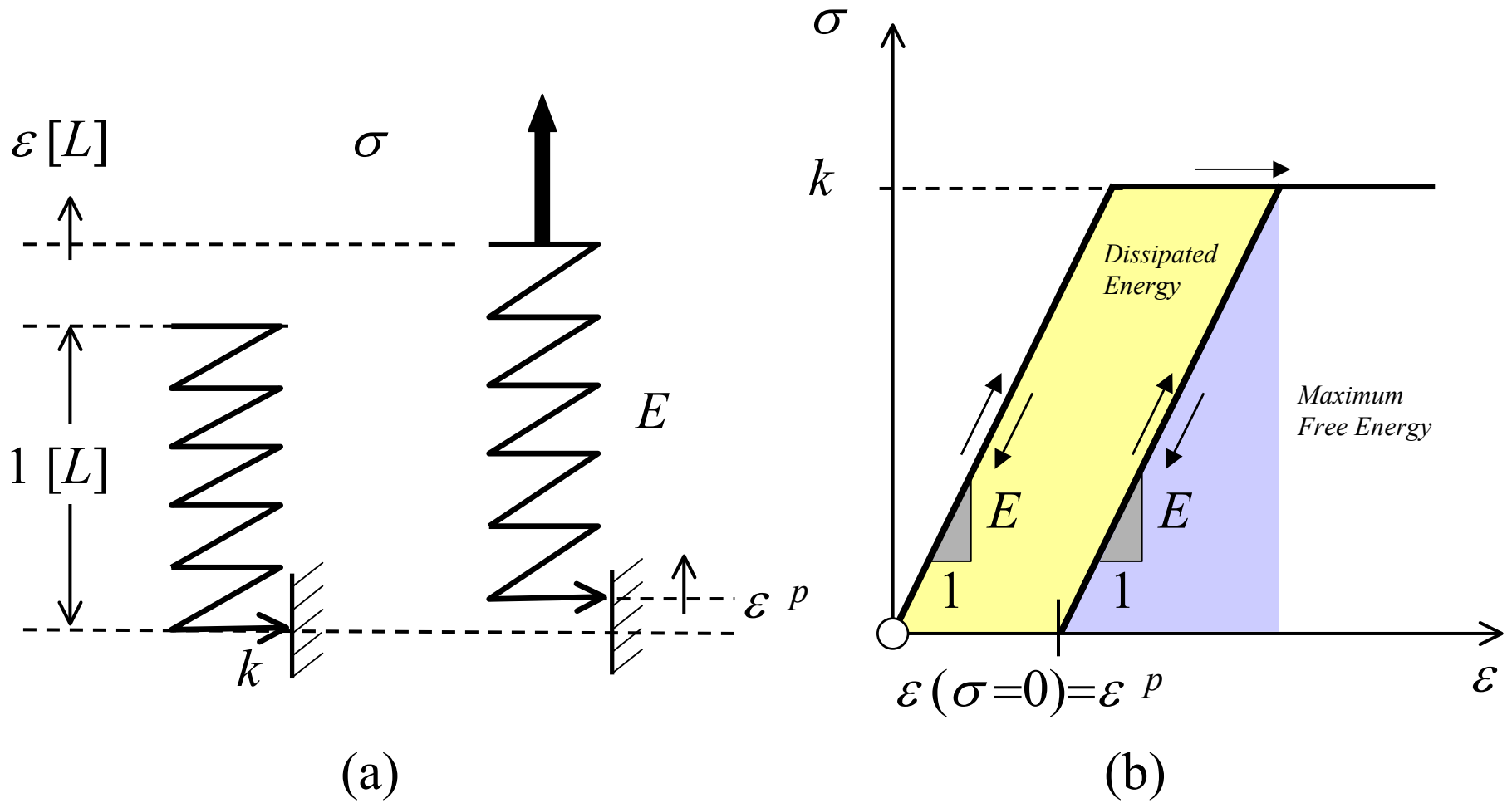


- 7 1D-Plasticity – An Energy Approach
- 8 Plasticity Models
- 9 Limit Analysis and Yield Design

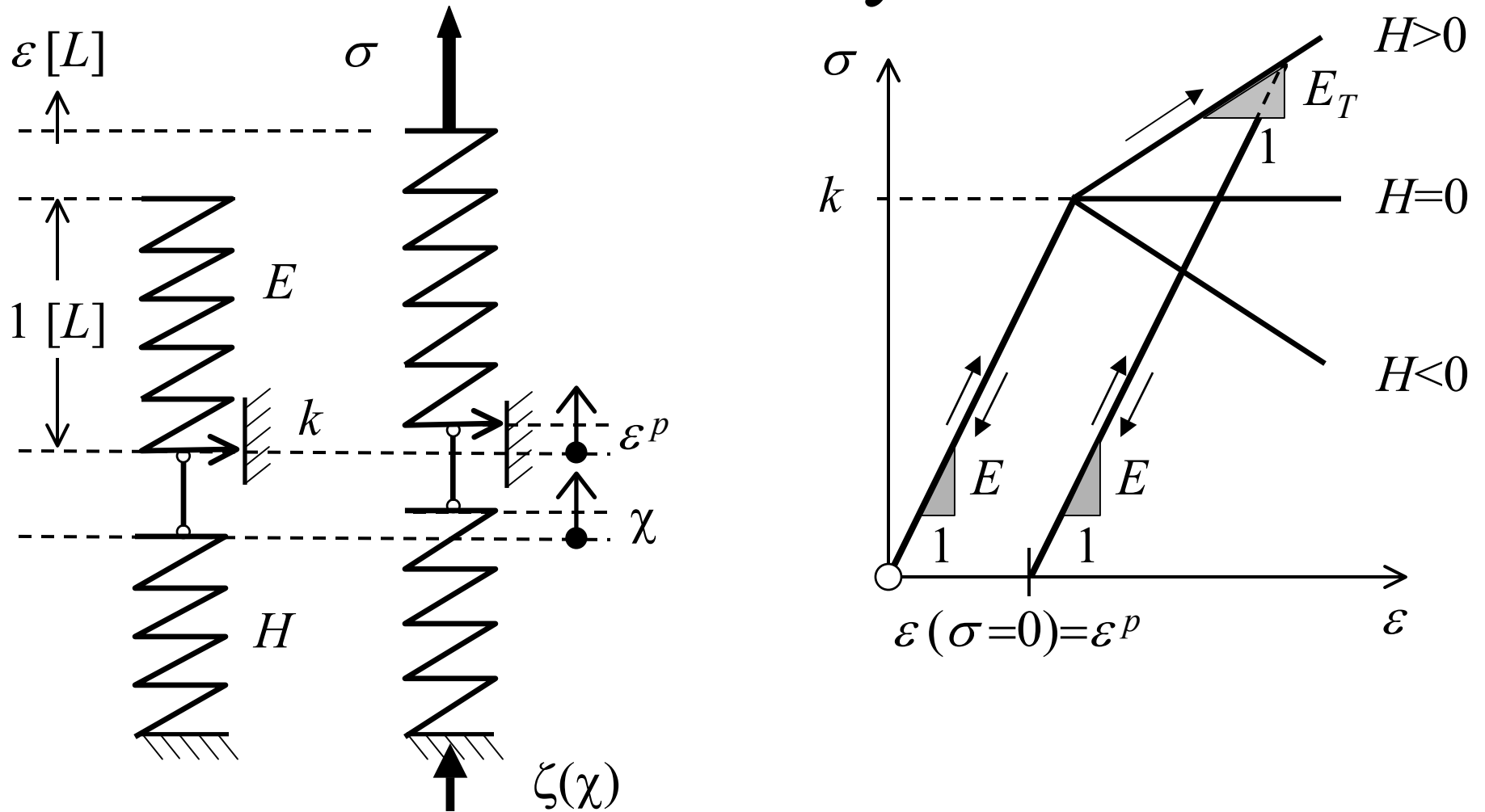
Friction Element



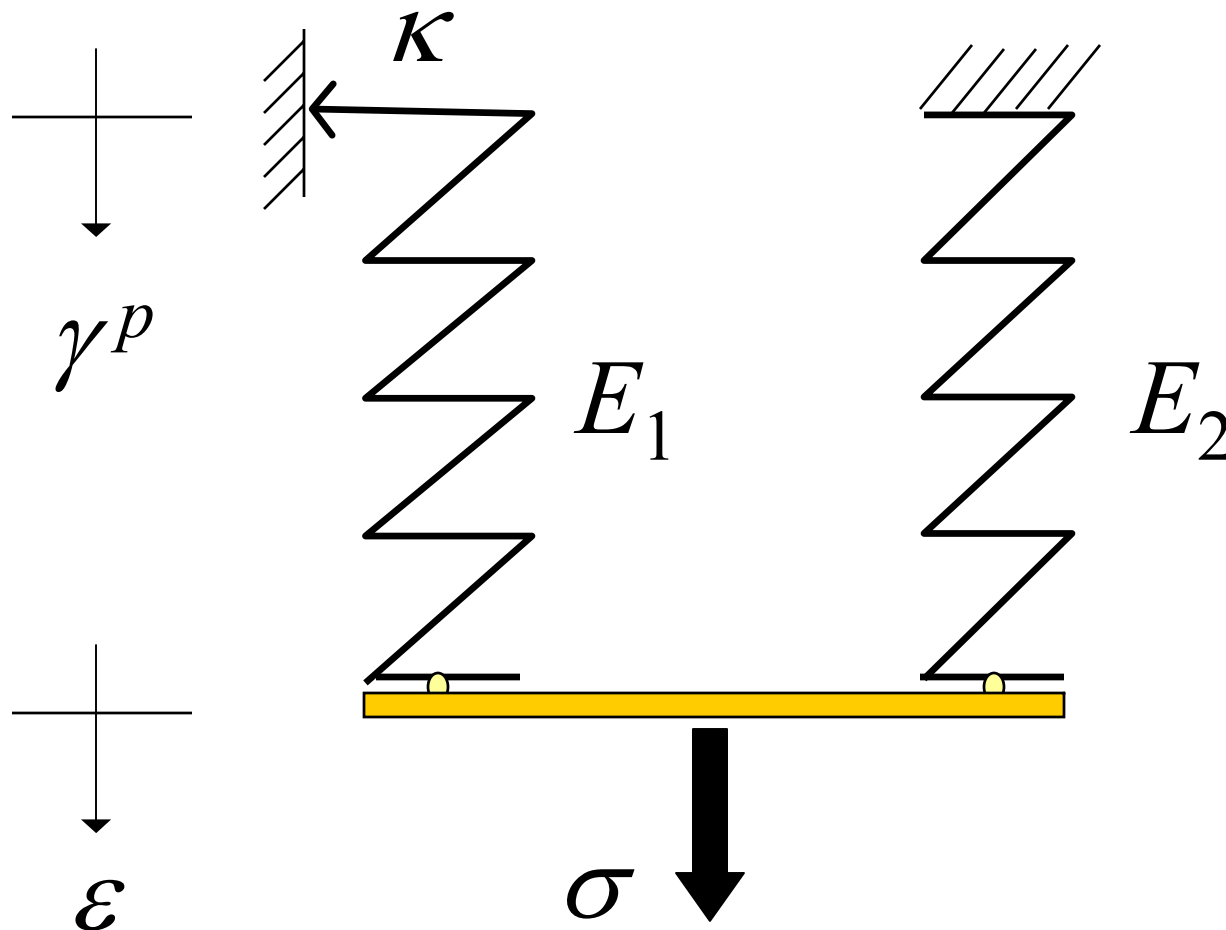
1D-Think Model of Ideal Plasticity



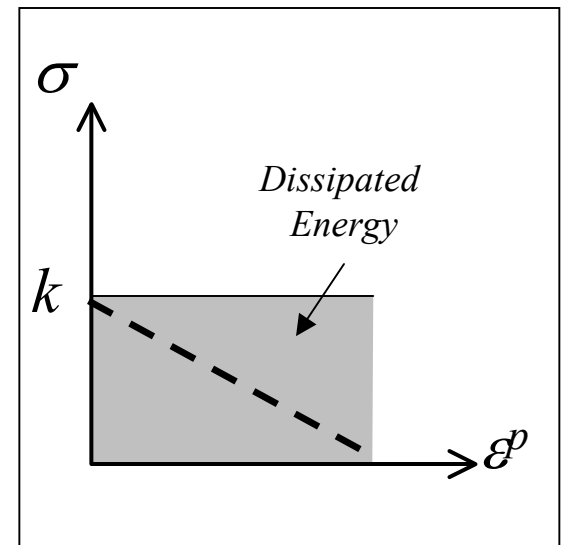
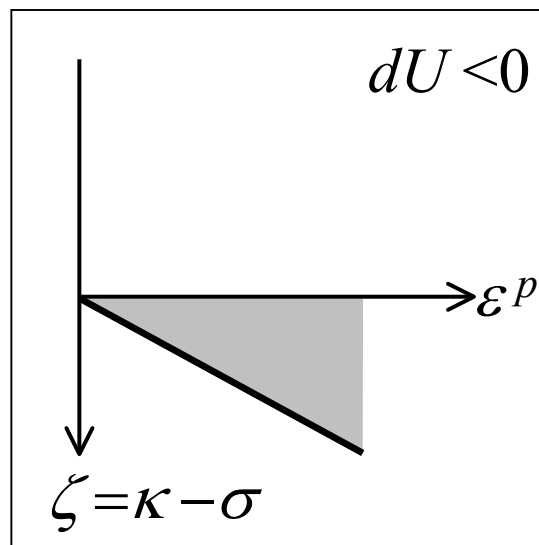
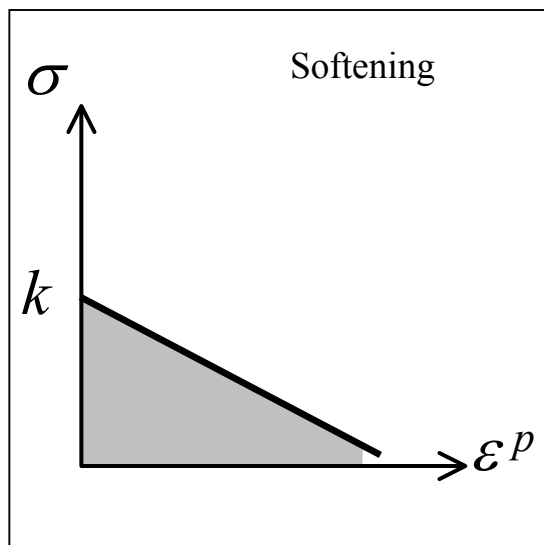
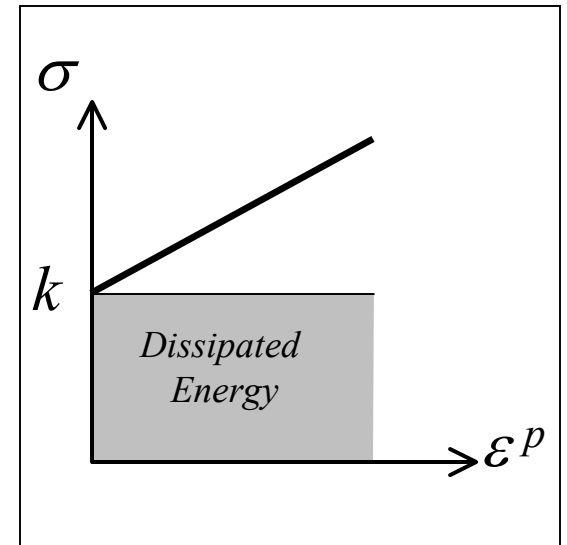
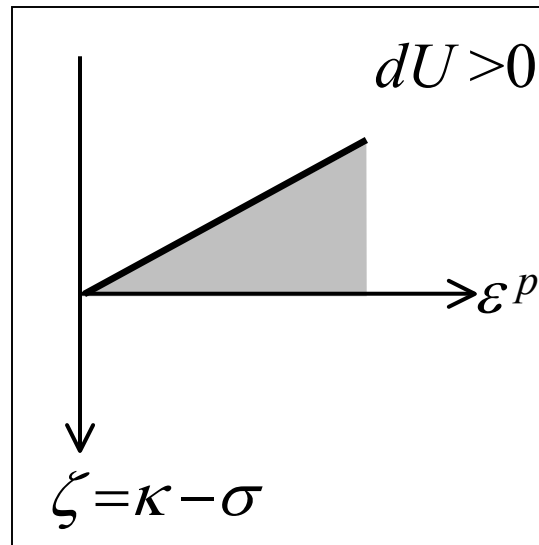
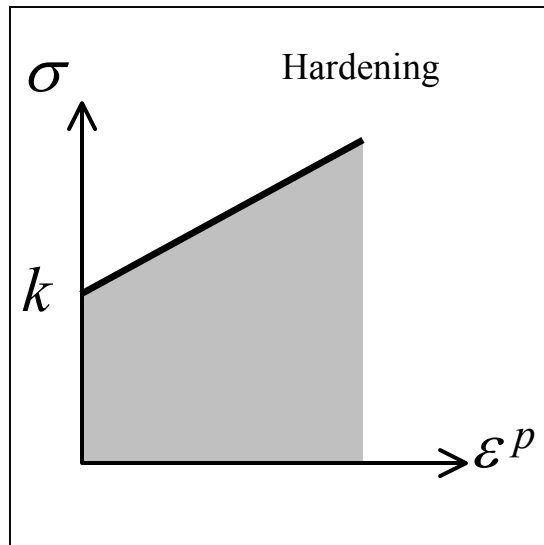
1D-Think Model of Hardening Plasticity



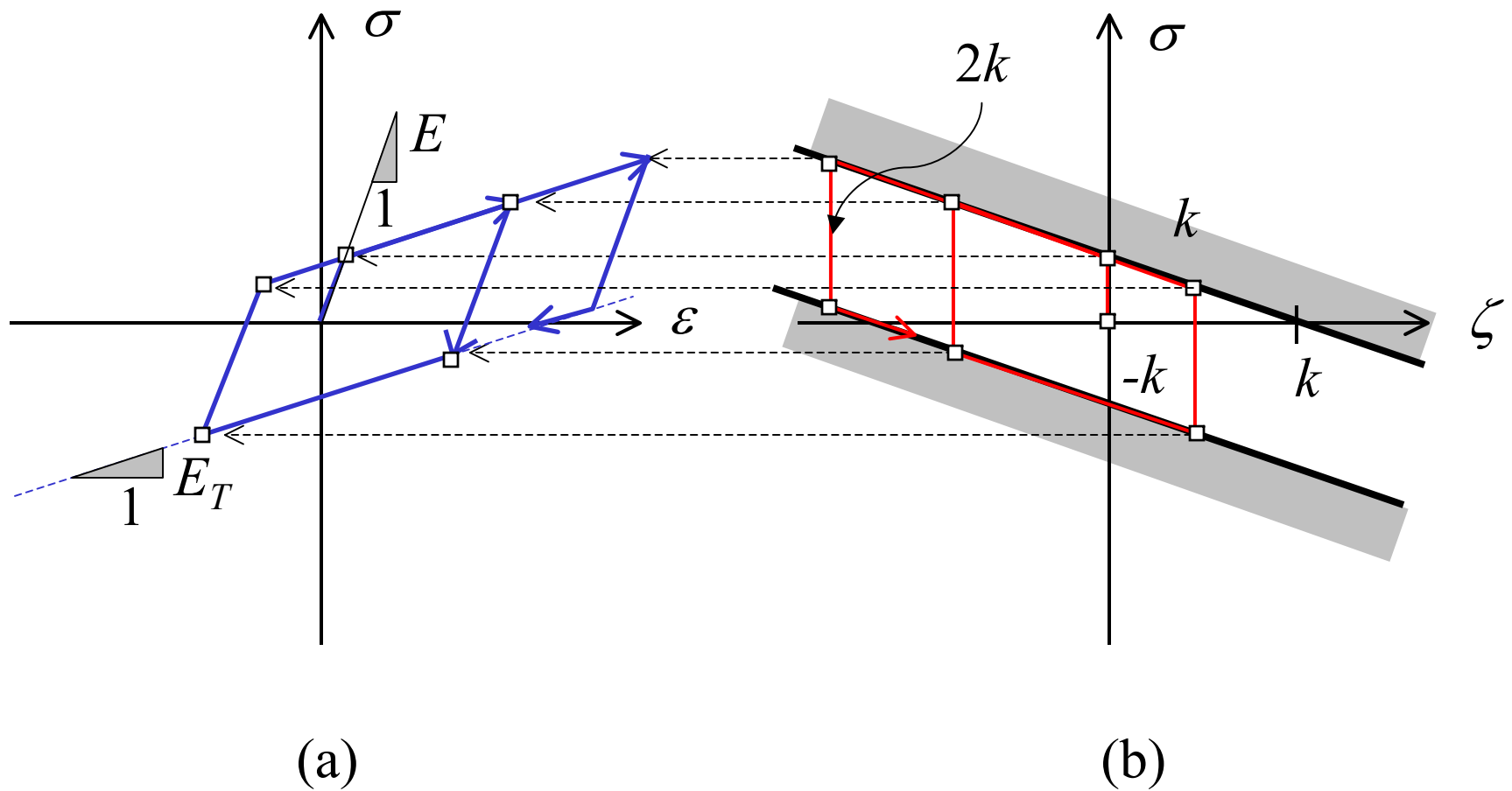
A model for the origin of the hardening energy



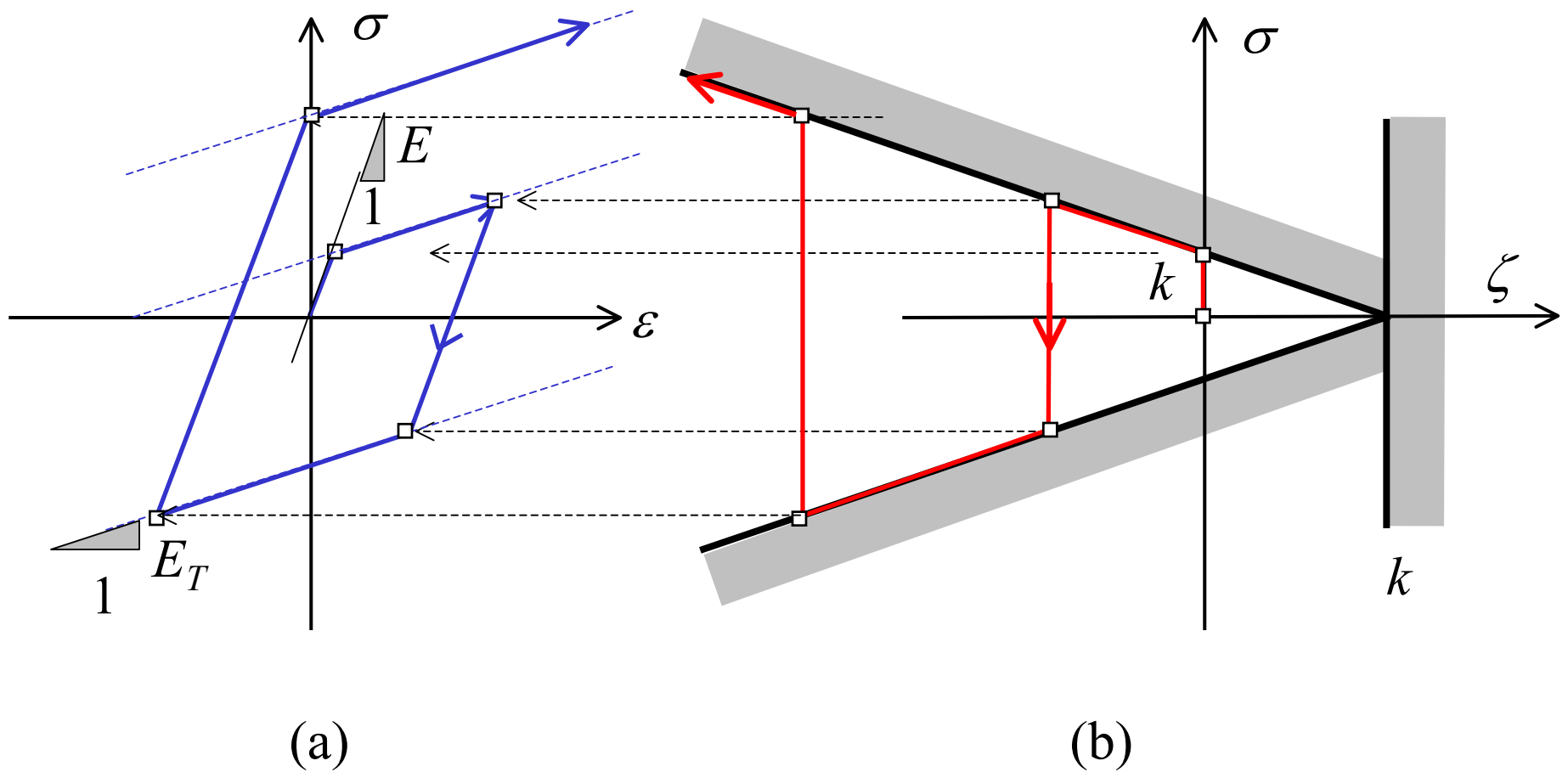
Energy Dissipation in Hardening Plasticity



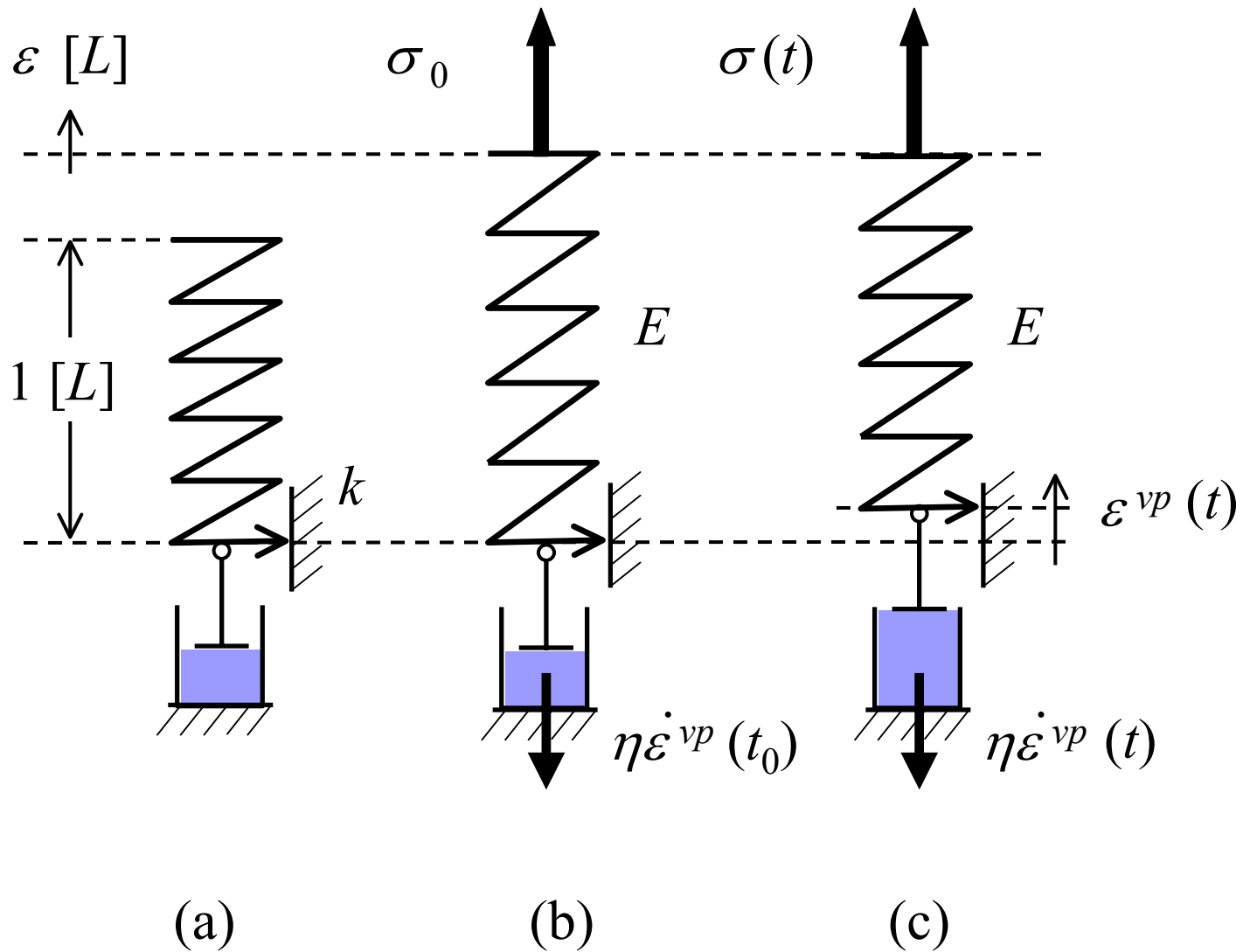
1D-Kinematic Hardening Model

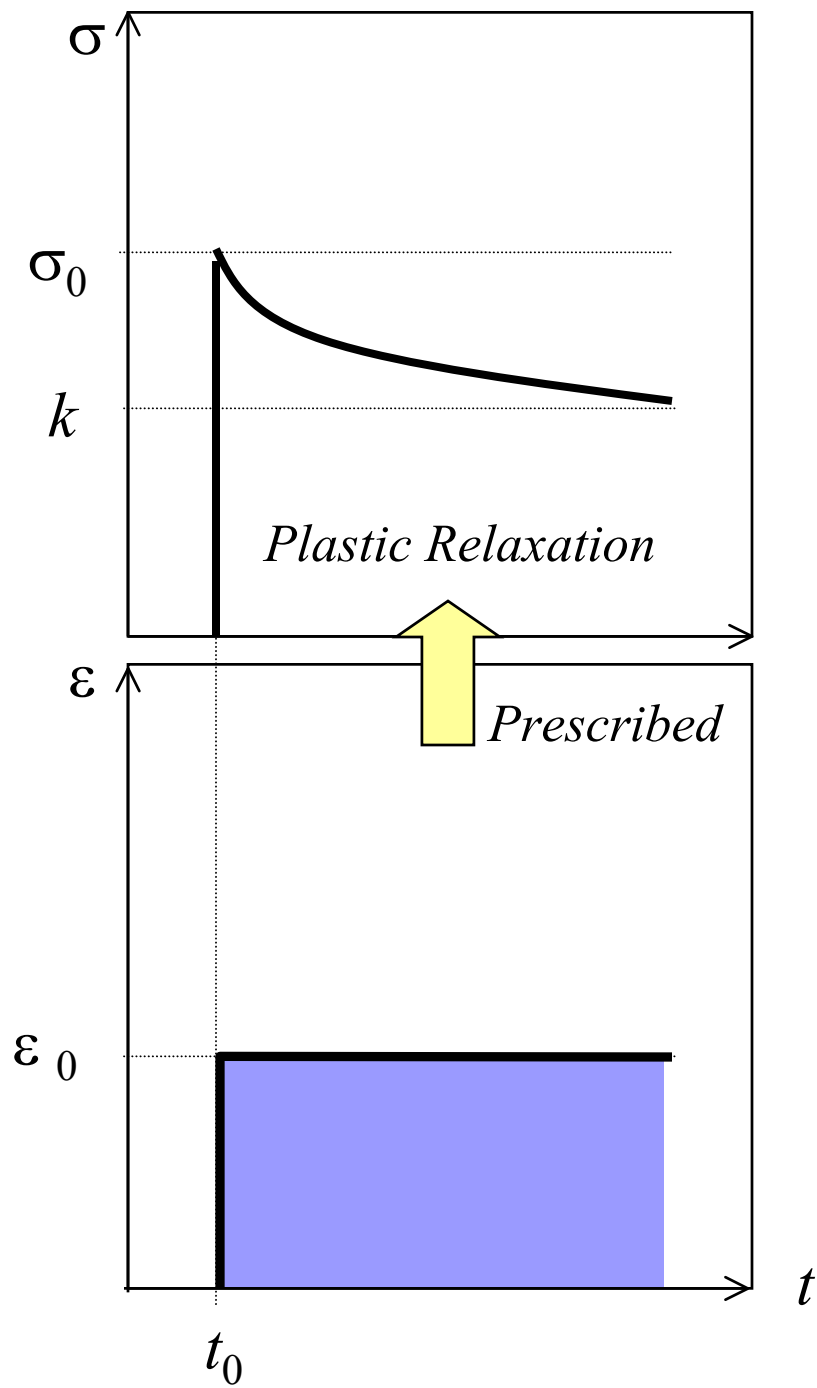
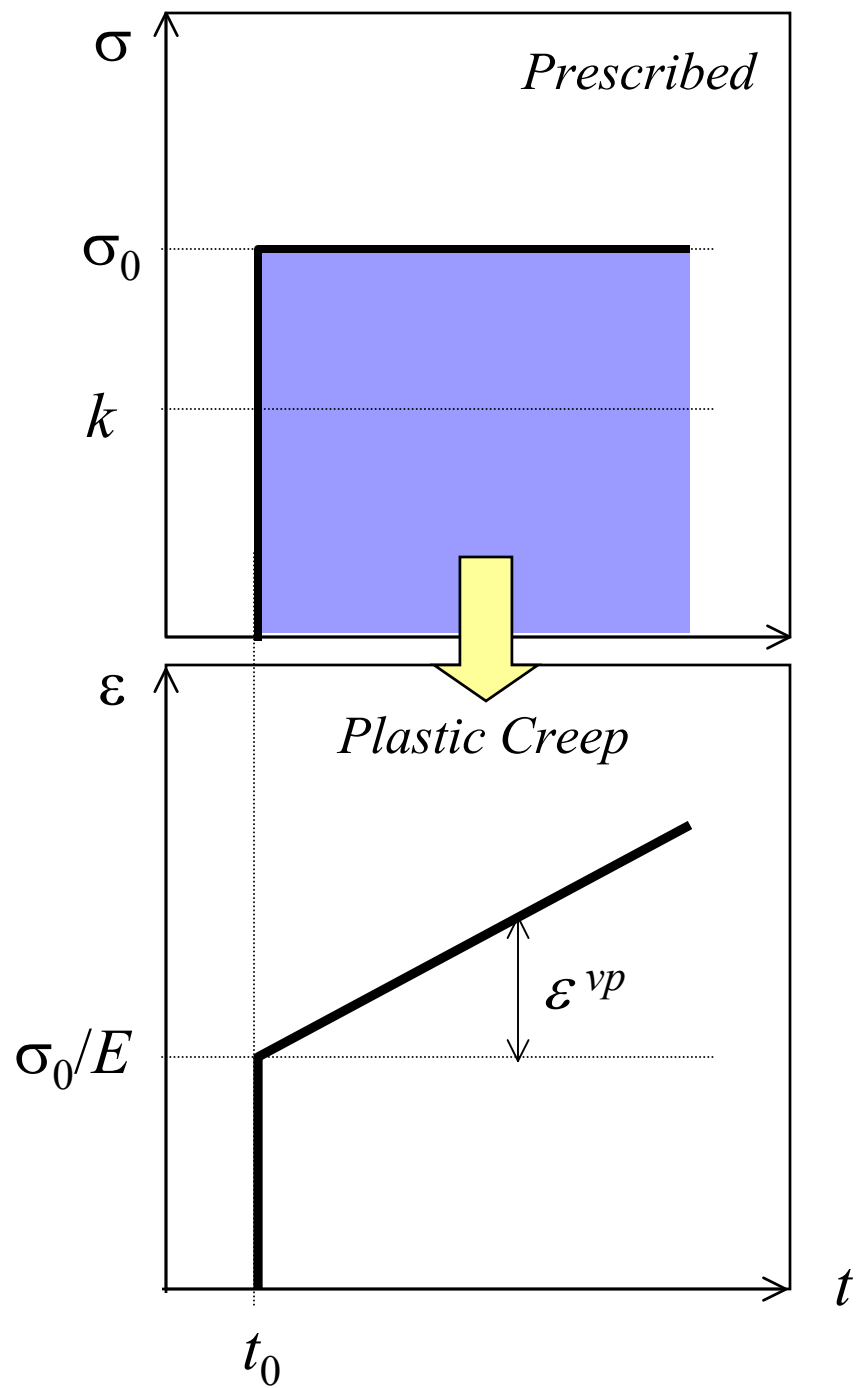


1D-Isotropic Hardening Model

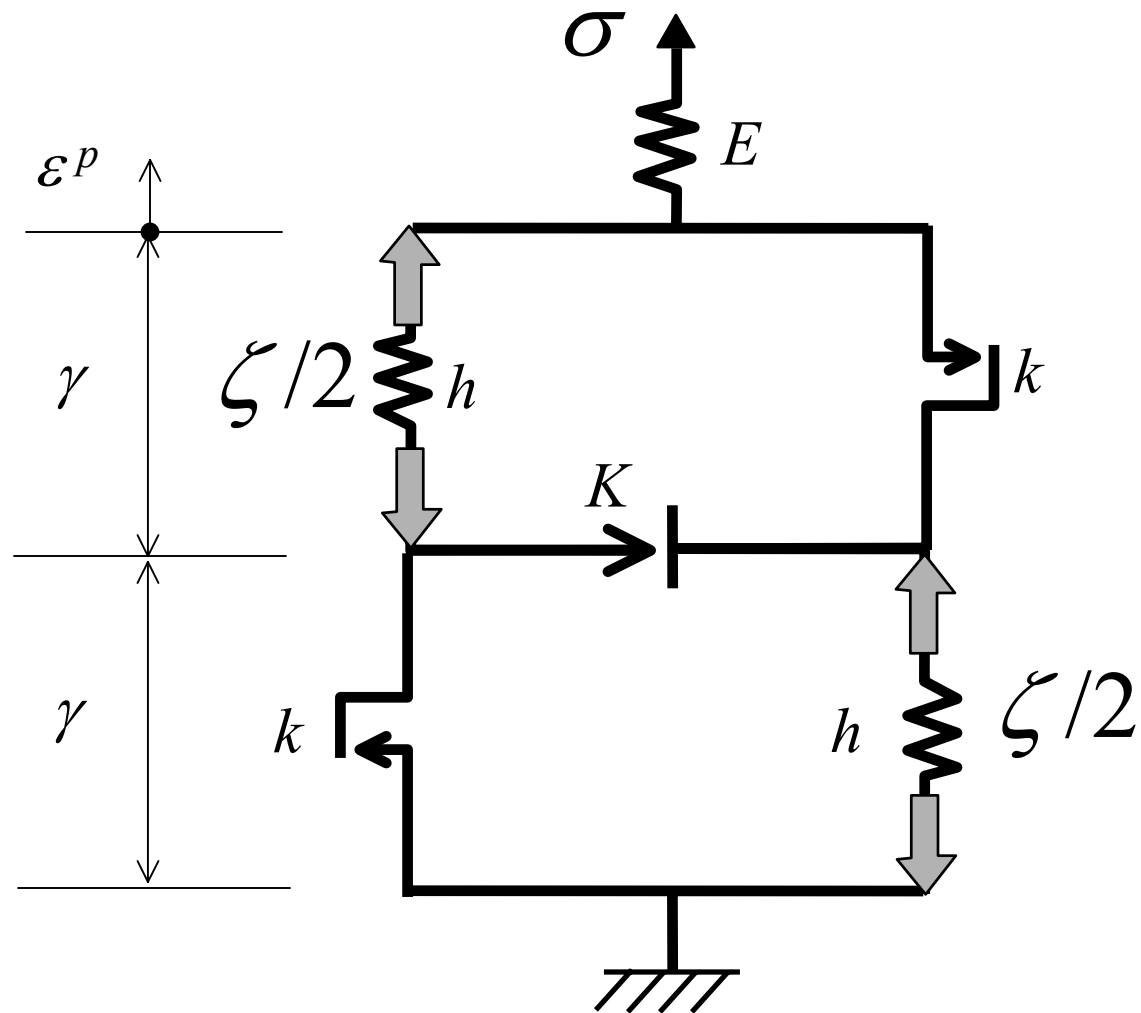


1D-Viscoplasticity

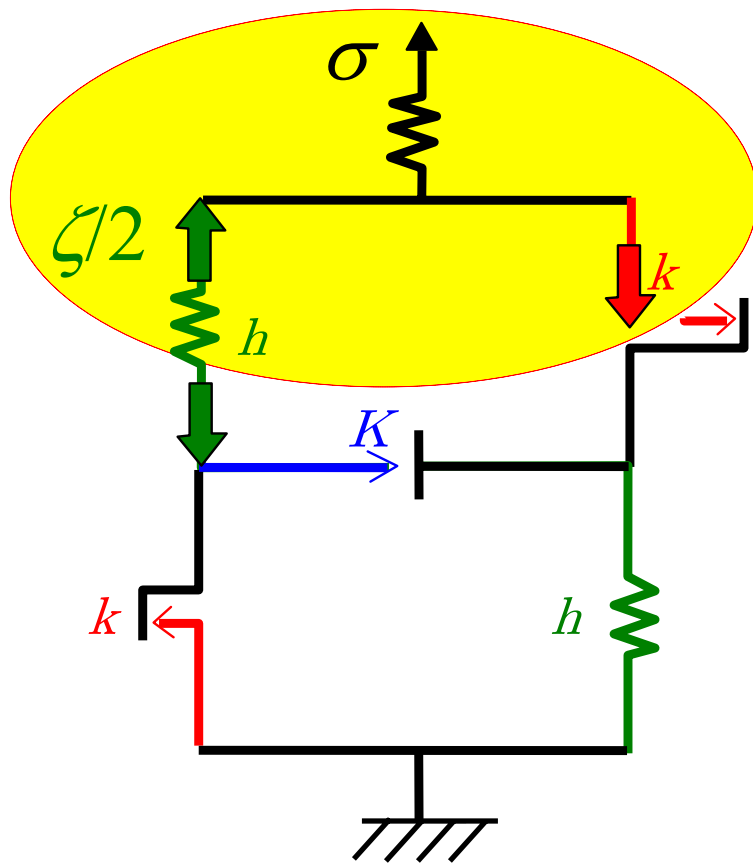




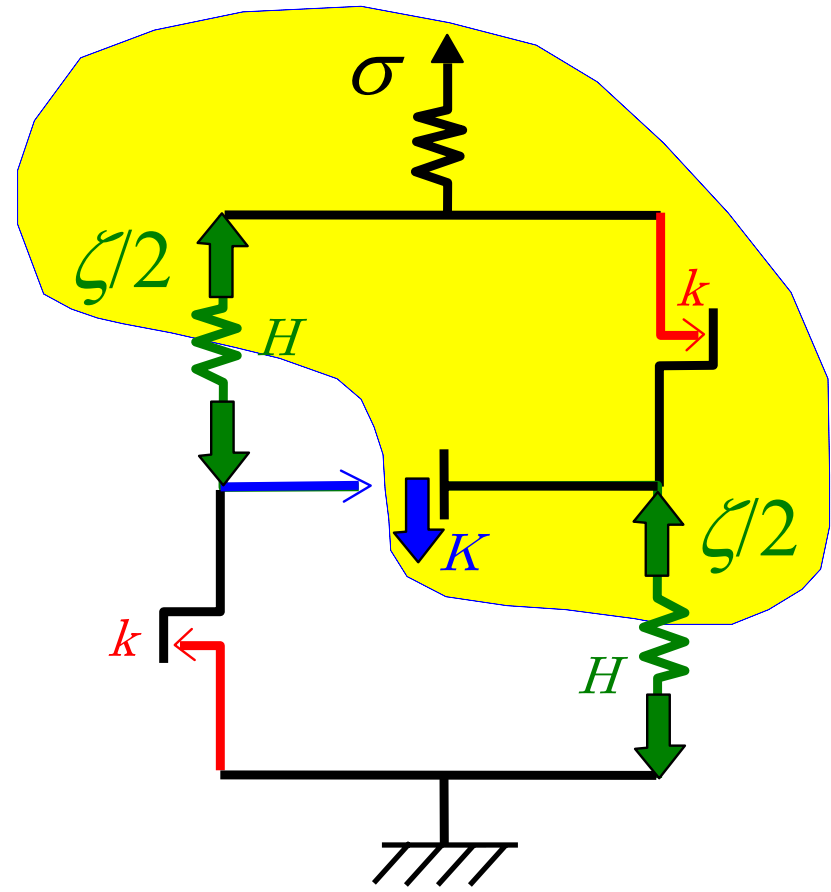
Training Set: Stefani Model



Stefani Model: Multisurface Plasticity

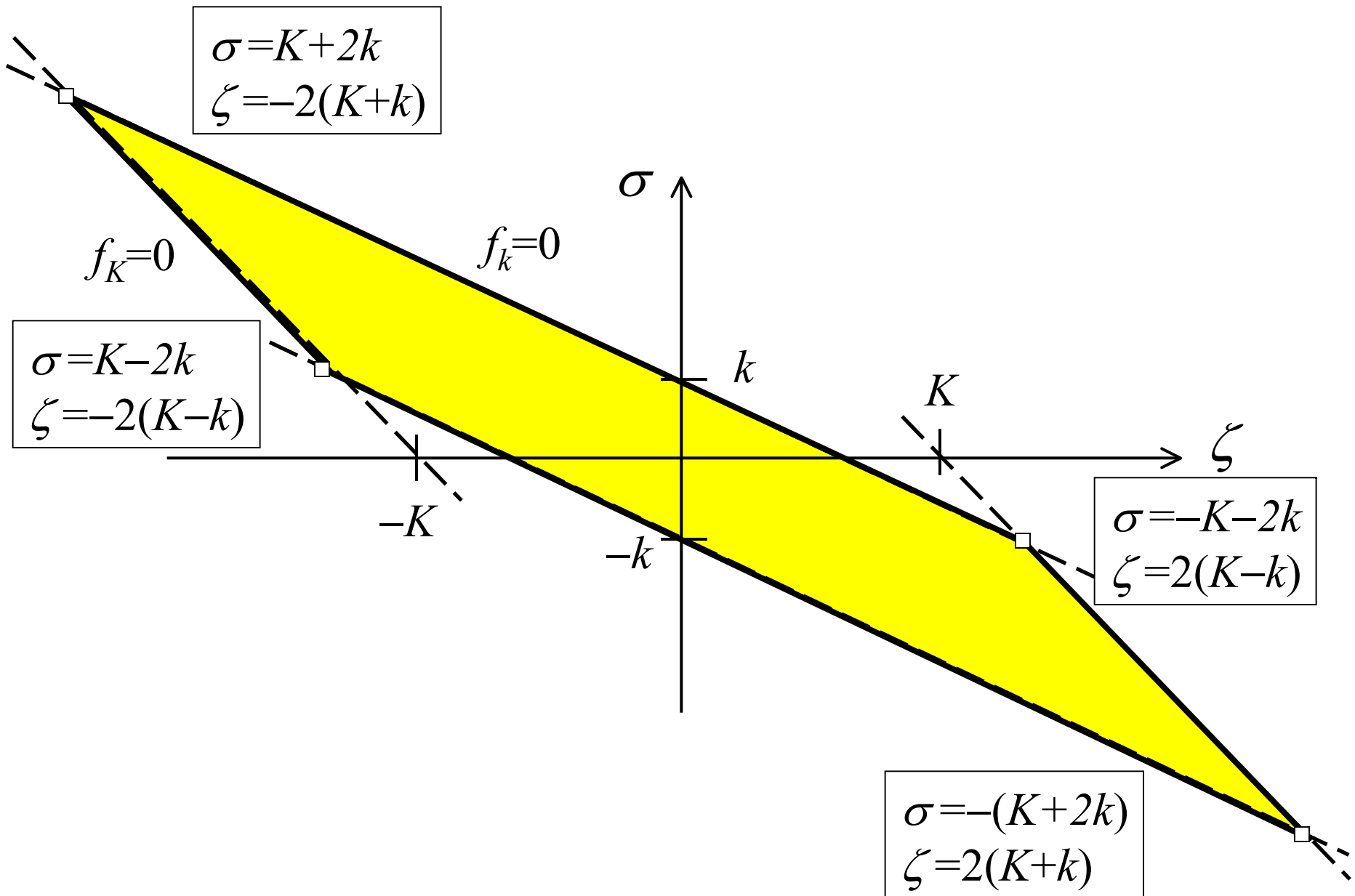


(a)

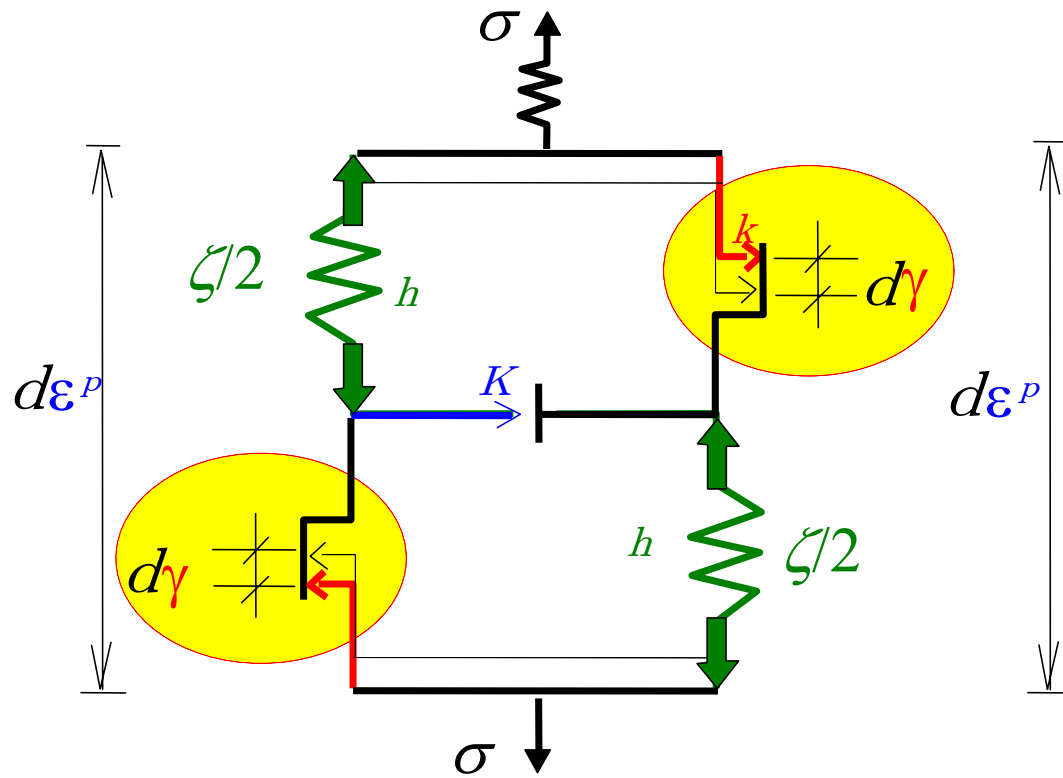


(b)

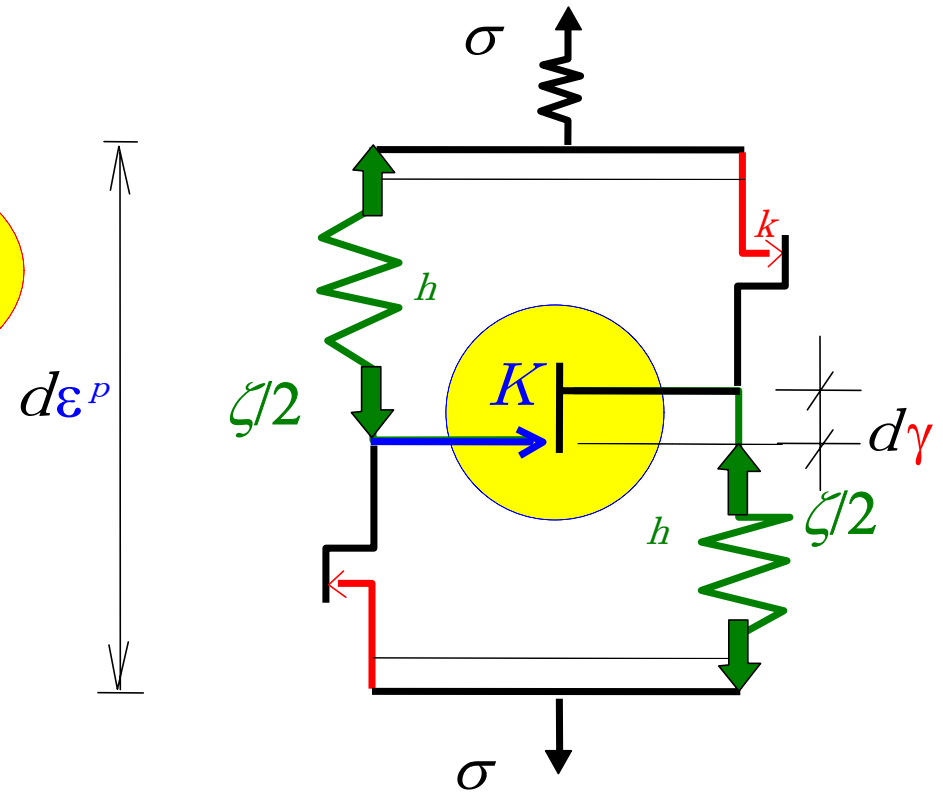
Stefani Model: Generalized Force Plane



Stefani Model: Dissipative Mechanisms

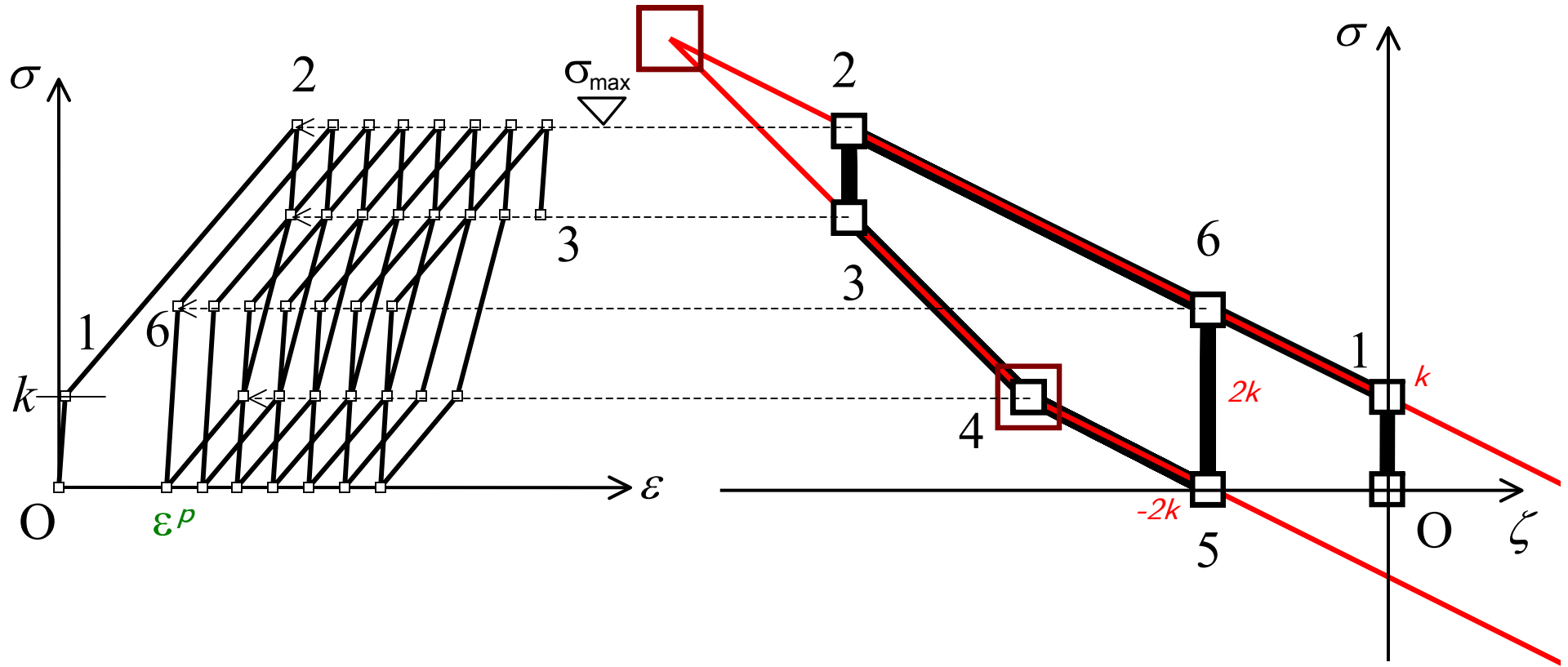


(a)

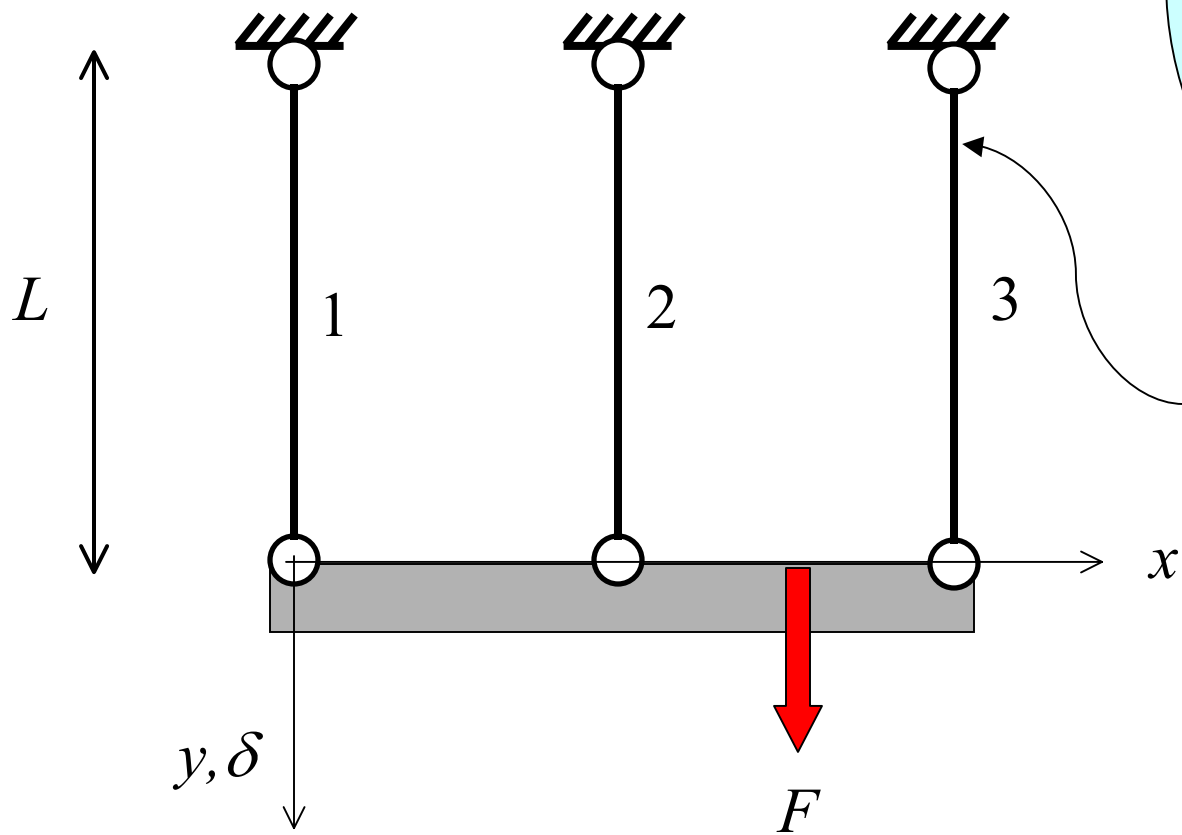


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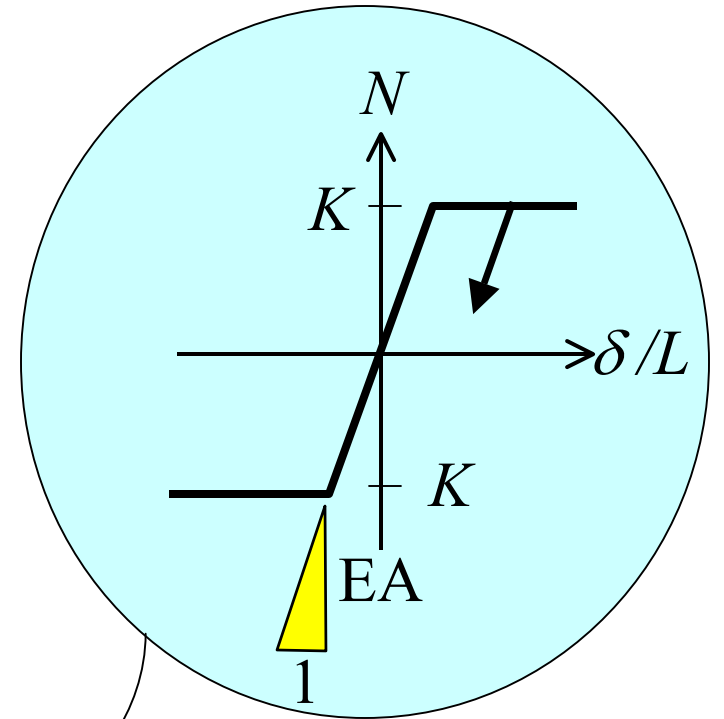
Stefani Model: Response under Cyclic Loading



Homework Set #4



(a)



(b)