Advanced Structural Concrete

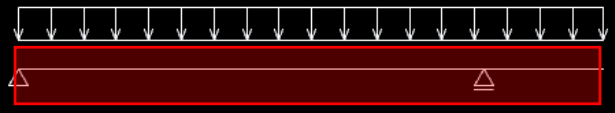
Introduction of Exercise 4

Introduction Ex 4

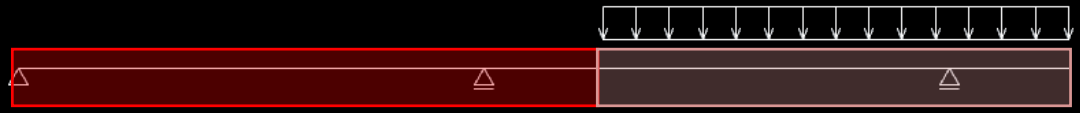
Construction in stages (system change)

t_p : Point in time after beginning of construction
t_c : Age of the concrete

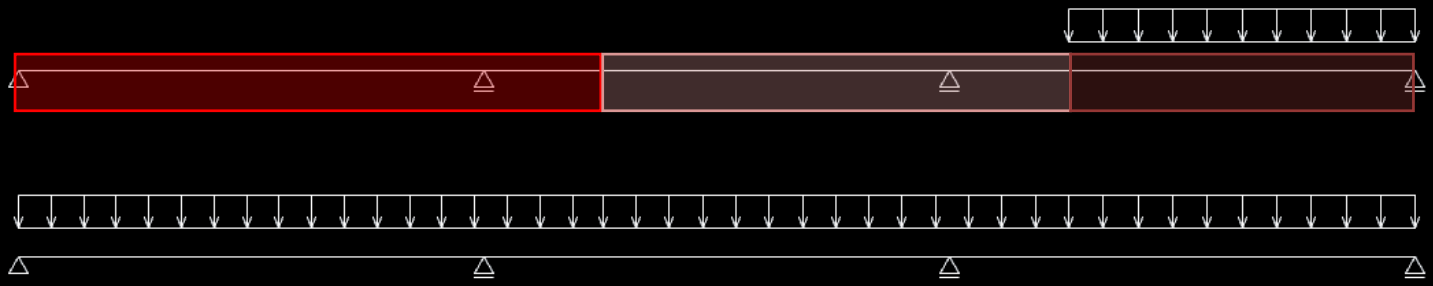
t_p = 30 days t_c = 30 days



t_p = 60 days t_c = 60 days t_c = 30 days



t_p = 90 days t_c = 90 days t_c = 60 days t_c = 30 days



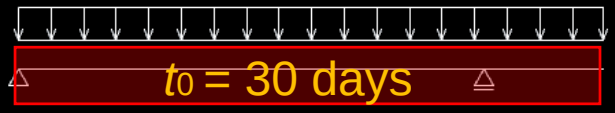
Introduction Ex 4

Construction in stages (system change)

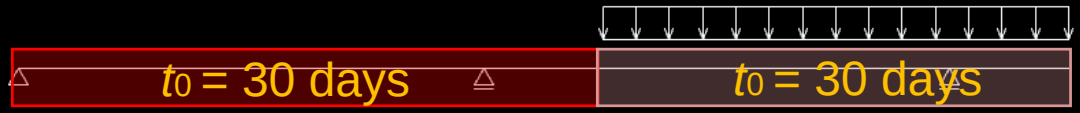
$$\varphi(t_0,t) = \varphi_{RH} \cdot \beta_{\sigma c} \cdot \beta_{fc} \cdot \beta(t_0) \cdot \beta(t - t_0)$$

t_p : Point in time after beginning of construction
t_c : Age of the concrete
t_0 : Age of the concrete at beginning of loading

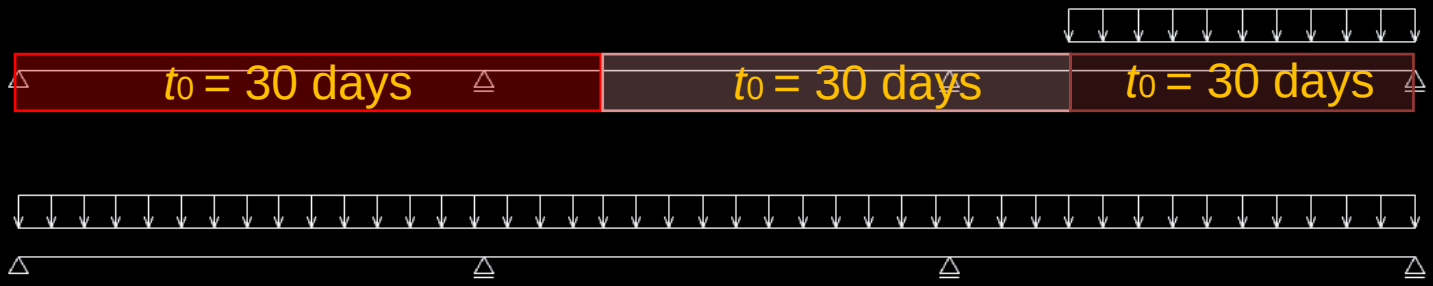
t_p = 30 days t_c = 30 days



t_p = 60 days t_c = 60 days t_c = 30 days



t_p = 90 days t_c = 90 days t_c = 60 days t_c = 30 days



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Construction in stages (system change)

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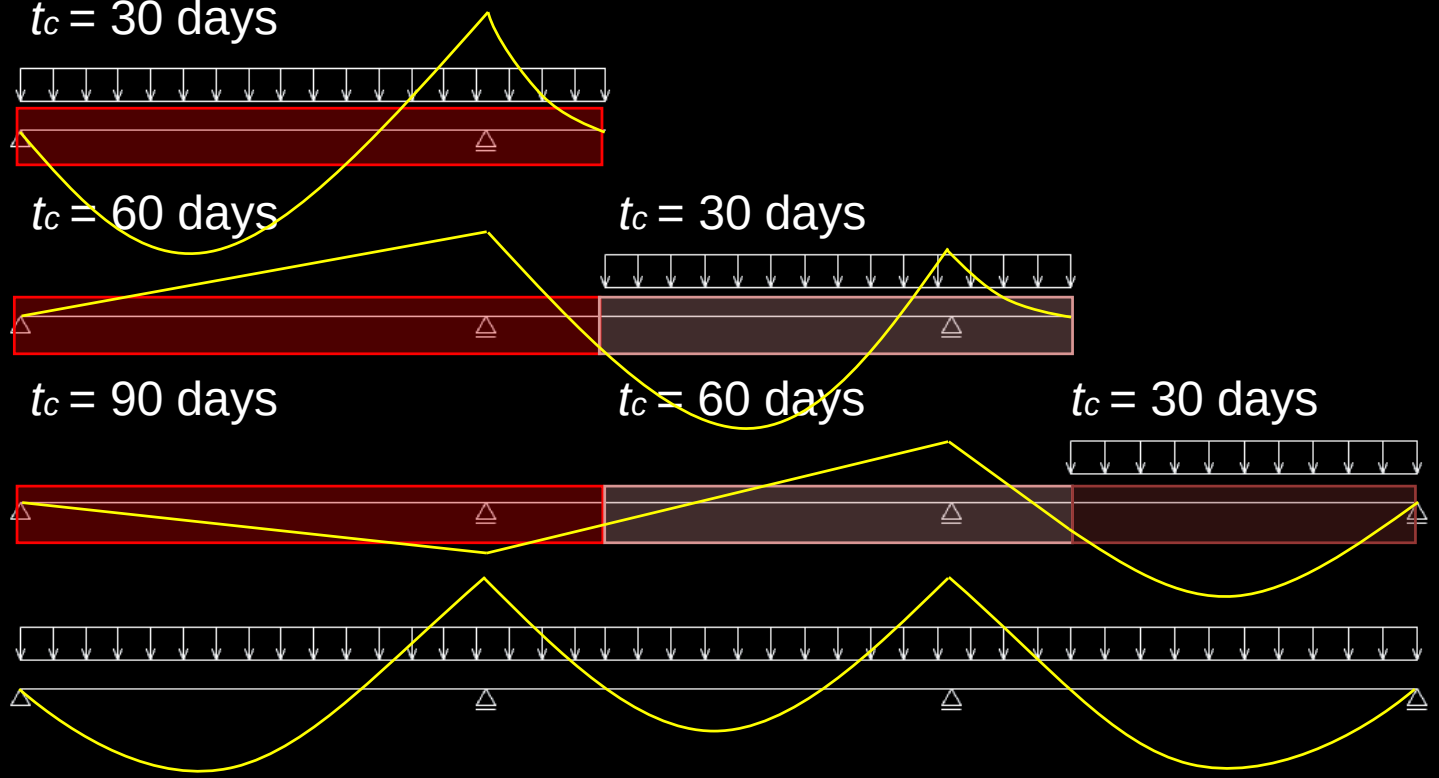

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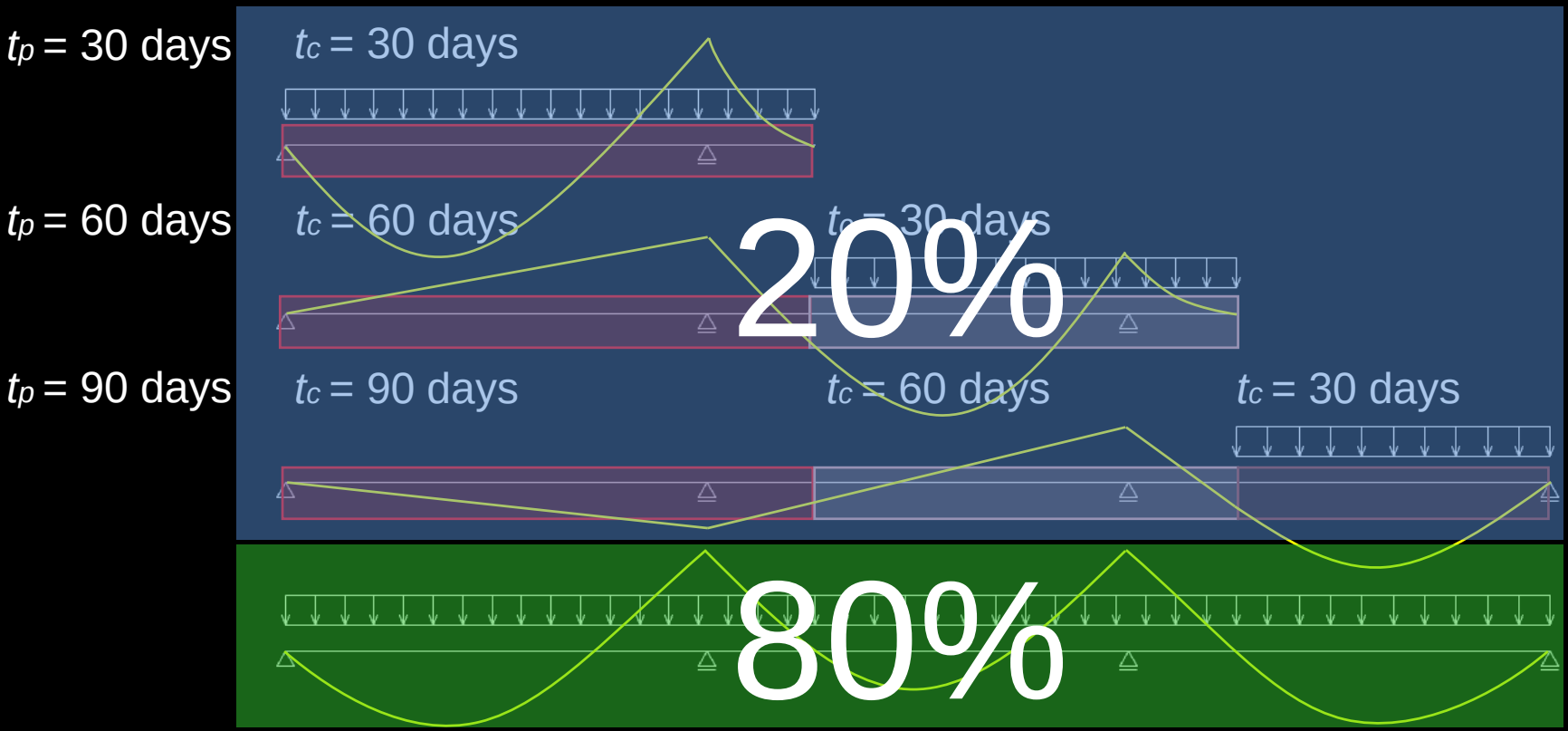
Construction in stages (system change)

t_p : Point in time after beginning of construction
t_c : Age of the concrete



Introduction Ex 4

Construction in stages (system change)

- Simple approximation of the bending moment curve for $t \rightarrow \infty$ with:
  - 80% of the bending moment distribution of, that would occur for a monolithic structure at $t = 0$.
  - 20% of the sum of the bending moments (from each stage) neglecting creep effects.
- Additional task: Determining the bending moment curve at $t_p = 120$ days and $t_p = 5$ years with Trost's method (Formula according to slides 28ff of the lecture).

$$M_t(x) = \sum_{i=1}^{n} \left[M_i(x) \cdot \left(1 - \frac{\varphi(t,t_0)}{1+\mu \cdot \varphi(t,t_0)} \right) \right] + M_{mono}(x) \cdot \frac{\varphi(t,t_0)}{1+\mu \cdot \varphi(t,t_0)}$$