

UNIVERSITY OF TWENTE.



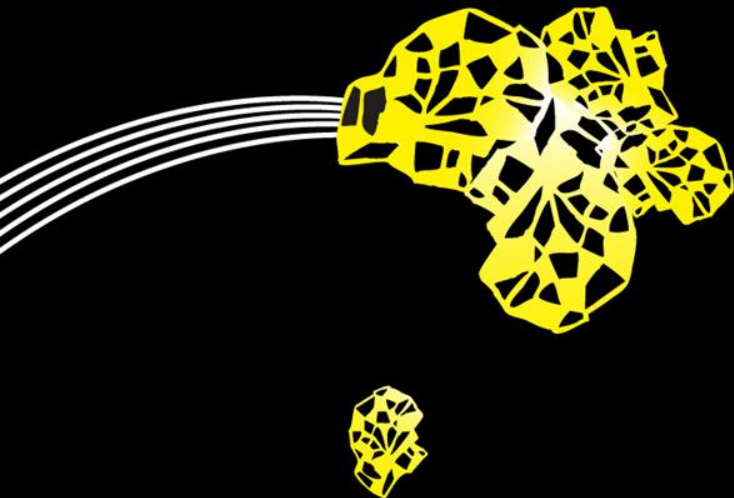
ADVANCED CHEMICAL REACTION ENGINEERING

PART - II

PROF. DR. SASCHA KERSTEN

PROF. DR. IR. WIM BRILMAN

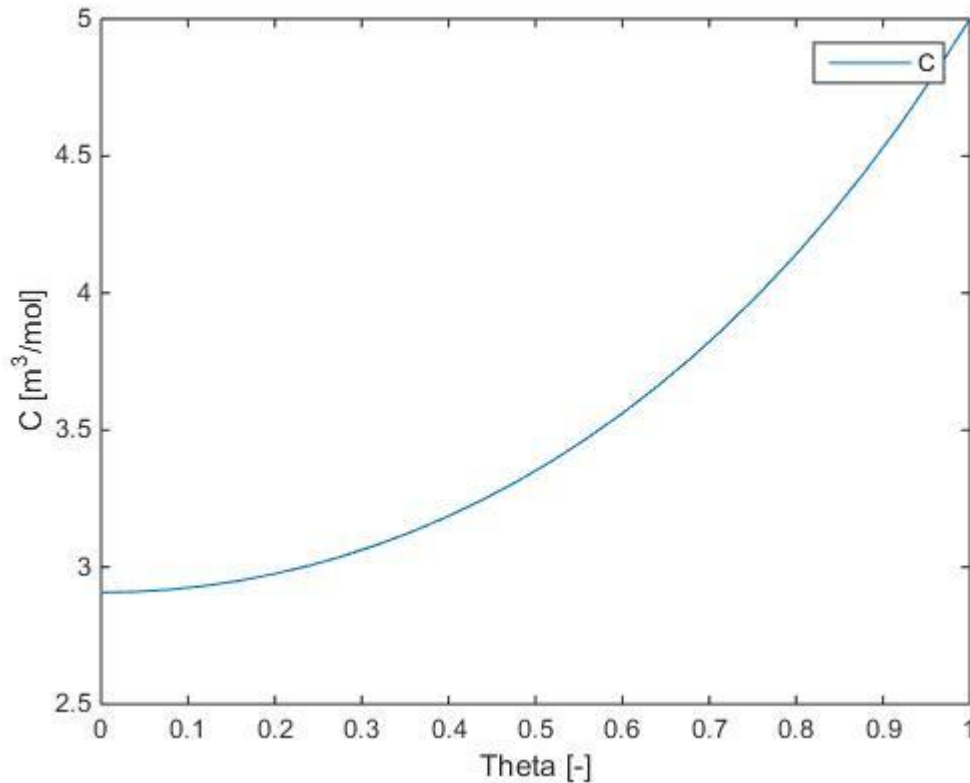
PUSHKAR MARATHE



CATALYST PARTICLE MODEL

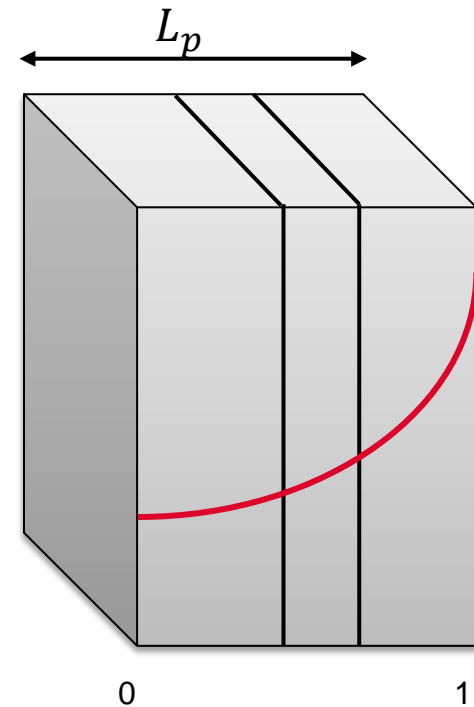
SLAB / PLANER GEOMETRY

$$\frac{d^2 c}{d\theta^2} - \Lambda^2 c^m = 0 \quad \theta = \frac{z}{L_p} \quad \Lambda = L_p \sqrt{\frac{k_v}{D}}$$



BC $\frac{dc}{d\theta} = 0; \quad @\theta = 0$

$c = c_{bulk}; \quad @\theta = 1$



FIXED BED HETEROGENEOUS MODEL

CONSIDERATION OF EFFECTIVENESS FACTOR

$$u \frac{dc_f}{dz_r} = -k_m a(c_f - c_s^*)$$

$$a' k_m (c_f - c_s^*) = \eta_p k_v c_s^{*m}$$

$$\eta_t = \frac{a' k_m (c_f - c_s^*)}{k_v c_f^m}$$

ODE15s

c_s^*

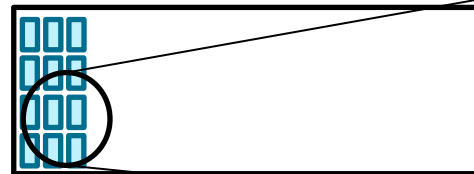
η_p

$$\frac{d^2 c_s}{d\theta^2} - \phi^2 c_s^m = 0 \quad \theta = \frac{z_p}{L_p} \quad \phi = L_p \sqrt{\frac{k_v}{D}}$$

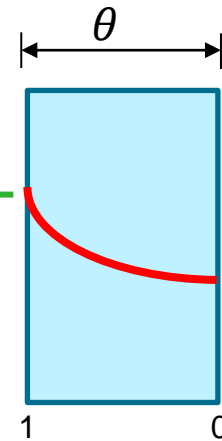
$$\eta_p = \frac{D \frac{dc_s}{d\theta} [@ \theta = 1]}{L_p^2 k_v c_s^{*m}}$$

BVP4C

$z_r \rightarrow$



$\frac{dc_s}{d\theta}$



FIXED BED HETEROGENEOUS MODEL

CONSIDERATION OF EFFECTIVENESS FACTOR

Results:

