

Diffusion-Advection

- Blanc Model
- Add Component/2D
- Geometry/Length unit: μm
- Geometry/Add Rectangle: $500 [\mu\text{m}] \times 250 [\mu\text{m}]$
- Geometry/Add Point: $50 [\mu\text{m}], 0$
- Geometry/Add Point: $100 [\mu\text{m}], 0$
- Add physics/Chemical Species Transport/Transport of Diluted Species
- Transport of Diluted Species/Transport properties/Diffusion coefficient: $100 [\mu\text{m}^2/\text{s}]$
- Transport of Diluted Species/Flux (Species c): $1\text{e-}6 \text{ mol}/(\text{m}^2 \text{ s})$, Selection: cell layer
- Add Study/Time Dependent: range(0,0.1,10), Results While Solving
- Mesh/Size Selection: Cell Layer, Predefined: Extremely fine
- Add Physics/Laminar Flow
- Laminar Flow/Fluid properties/ Density: $1\text{e}3 [\text{kg}/\text{m}^3]$, Dynamic Viscosity: $1\text{e-}3 [\text{Pa s}]$
- Laminar Flow/Inlet/Fully developed flow/Average Velocity: $1 [\text{mm}/\text{s}]$
- Laminar Flow/Outlet/Fully developed flow/Average pressure/ $P_{\text{av}}=0$
- Transport of Diluted Species/Transport properties/Velocity field/Velocity field (spf)
- Could be 2-ways coupled, or 1-way.
- Add Study/Time Dependent: range(0,0.1,10), Results While Solving (or duplicate Step 1)
- Study 1/ uncheck Transport and plot while solving in Step 1, and uncheck Flow in Step 2

Fluid-Structure Interaction (FSI)

- Blanc Model
- Add Component/2D
- Geometry/Length unit: mm
- Geometry/Add Rectangle: $30 [\text{mm}] \times 10 [\text{mm}]$
- Geometry/Add Rectangle: $0.5 [\text{mm}] \times 7 [\text{mm}]$, Base corner x = 10 mm
- Geometry/Fillet Selection 2 corners of small rectangle inside large rectangle, Radius: 0.25
- Add Physics/Fluid Flow/Fluid Structure Interaction (fsi)
- Fluid Structure Interaction/Linear elastic material/ Selection: small rectangle, $E = 10 [\text{MPa}]$, $\nu = 0.4$, $\rho = 1\text{e}3 [\text{kg}/\text{m}^3]$
- Fluid Structure Interaction/Fluid Properties/ Selection: Large rectangle, $\rho = 1\text{e}3 [\text{kg}/\text{m}^3]$, $\mu = 1\text{e-}3 [\text{Pa s}]$
- Fluid Structure Interaction/Inlet/Fully developed flow/Inlet Selection: left edge, Average velocity: $500 [\text{mm}/\text{s}]$
- Fluid Structure Interaction/Outlet/Fully developed flow/Outlet Selection: right edge, Average pressure: 0 [Pa]
- Fluid Structure Interaction/Solid Mechanics/Fixed Constraint/ Selection: lower edge of small rectangle, $x=y=0$
- Multiphysics/Fluid-Structure Interaction/Fixed Geometry/Fully coupled, check that fluid-solid boundary is selected.
- Component/Moving Mesh/Deforming domain/Selection: fluid domain, Smoothing: default Yeoh or hyperelastic
- Add study/Time dependent (0,0.1,10) Plot while solving
- Compute: ERROR: Failed to find consistent initial values
- Component/Definition/Functions/Step Location: 5, From 0 To 1, Transition zone: 10
- In Inlet field, replace with $\text{step1}(t)*500 [\text{mm}/\text{s}]$
- Compute, check results on top of small rectangle
- Fluid Structure-Interaction/Free deformation settings/Mesh Smoothing Type/Winslow
- Compute, not full convergence, compare results on top of small rectangle