

## Diffusion-Advection

- Blanc Model
- Add Component/2D
- Geometry/Length unit:  $\mu\text{m}$
- Geometry/Add Rectangle: 500 [ $\mu\text{m}$ ] x 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): 1e-6 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: 1e3 [ $\text{kg}/\text{m}^3$ ], Dynamic Viscosity: 1e-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/Pav=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 [mm] x 10 [mm]
- Geometry/Add Rectangle: 0.5 [mm] x 7 [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