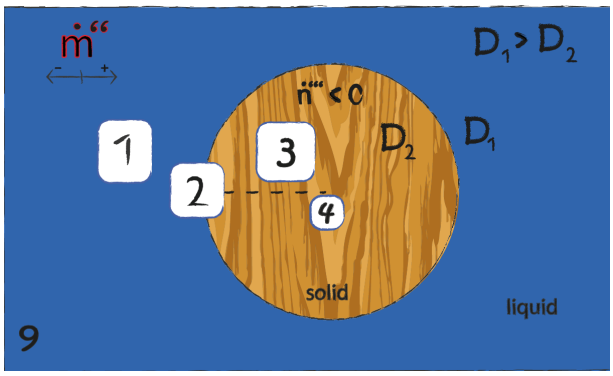
Mass Flux Profile: Task 9



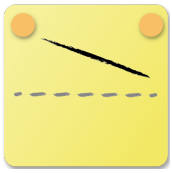
The image describes a solid circular body with a volumetric mass sink surrounded by a liquid with a greater diffusion coefficient.

1 

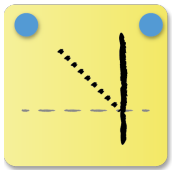
As there is no mass source or sink within the liquid, mass flux is constant in radial direction. With cross section area decreasing proportional to r, specific mass flux is rising in a steeper manner towards the solid. The fact that mass is transfered towards the solid is given by the mass sink it contains.

2 

The transition is characterized by a kink in specific mass flux profile, as the mass sink causes the mass flux to decrease within the solid. In contrast to the concentration profile, different diffusivities have no impact on the specific mass fluxes shape.

3 

Via a mass balance for the circular body it can be shown, that specific mass flux decreases linearly towards the body's center.

4 

Due to symmetry considerations, mass flux vanishes at the body's center.