

# Multiphase Flows – WS 2022/23

## Problem Session 7 – **Solution:** Interface Tracking (3/3)



Aranya Dan, M.Tech.

Institute for Combustion Technology  
RWTH Aachen University

# Problem Session 7: Interface Tracking (3/3)

---

## Problem I

a) Normalized tangential interface vectors (first order approximation):

$$t_{l+1/2}^x = \frac{x_{l+1} - x_l}{\Delta s_l}$$
$$t_{l+1/2}^y = \frac{y_{l+1} - y_l}{\Delta s_l}$$

b) & c) The complete code has been uploaded to Moodle.

## Problem 2

a) Derivation of surface force per unit area:

$$(f_{\sigma})_{i,j} \cdot \Delta x \cdot \Delta y = \sum_l \delta f_{\sigma}^l w_{i,j}^l$$

with  $w_{i,j}^l = \left(\frac{x_{i+1}-x_f}{\Delta x}\right) \left(\frac{y_{j+1}-y_f}{\Delta y}\right)$  if front point is in upper right cell w.r.t. grid point

$w_{i,j}^l = \left(\frac{x_f-x_i}{\Delta x}\right) \left(\frac{y_{j+1}-y_f}{\Delta y}\right)$  if front point is in upper left cell w.r.t. grid point

$w_{i,j}^l = \left(\frac{x_{i+1}-x_f}{\Delta x}\right) \left(\frac{y_f-y_j}{\Delta y}\right)$  if front point is in lower right cell w.r.t. grid point

$w_{i,j}^l = \left(\frac{x_f-x_i}{\Delta x}\right) \left(\frac{y_f-y_j}{\Delta y}\right)$  if front point is in lower left cell w.r.t. grid point

$$\Rightarrow (f_{\sigma})_{i,j} = \sum_l \frac{\delta f_{\sigma}^l w_{i,j}^l}{\Delta x \Delta y}$$

b) The complete code has been uploaded to Moodle.

# Problem Session 7: Interface Tracking (3/3)

---

## Problem 3

The complete code has been uploaded to Moodle.



**Thank you for your attention**

**Aranya Dan, M.Tech.**

Institute for Combustion Technology  
RWTH Aachen University

<http://www.itv.rwth-aachen.de>