

## **Exercise 8 - Numerical methods for fluid-structure interaction (Winter term 2015)**

### **Exercise 8.1:**

Review finite element choices for the spatial discretization of the Navier-Stokes equations:

- Give an example of a conforming Stokes element with a discontinuous pressure;
- Give an example of a conforming Stokes element with a continuous pressure;
- Give an example of a non-conforming Stokes element;
- Give an example of an equal-order stabilized Stokes-element.

For all choices, please describe briefly advantages and shortcomings compared to the other elements.

### **Exercise 8.2:**

Explain and describe one method that stabilizes the numerical solution of the Navier-Stokes equations in the case of high Reynolds numbers.

Hint. Review methods for transport stabilization.

### **Exercise 8.3:**

Recapitulate the problem of ‘locking’ in the numerical solution of elasticity. How is locking characterized and what is a possible solution to overcome this effect?

Hint. You can either design a specific example with mathematical justification or give an interpretation from an engineering point of view.

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**Discussion of exercises: Jan 18, 2016**