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Exercise 7 - Numerical methods for fluid-structure interaction (Winter term 2015)

Exercise 7.1:

Let $\rho_f, \hat{J}, \hat{F}$ and $\hat{f}$ be given as usually. Consider the following parabolic problem in $\hat{\Omega}$: Find $\hat{v}$ such that

$$\begin{aligned}
\rho_f \hat{J} \partial_t \hat{v} - \hat{\nabla} \cdot (\hat{J} \sigma_f \hat{F}^{-T}) &= \rho_f \hat{J} \hat{f} \quad \text{in } \hat{\Omega} \times [0,T] \\
\hat{v} &= 0 \quad \text{on } \partial_D \hat{\Omega} \times [0,T] \\
\hat{J} \sigma_f \hat{F}^{-T} \cdot \hat{n} &= \hat{g} \quad \text{on } \partial_N \hat{\Omega} \times [0,T] \\
\hat{v}(0) &= \hat{v}_0 \quad \text{in } \hat{\Omega} \times \{0\}.
\end{aligned}$$

1. Formulate the weak form on the continuous level using Bochner spaces (i.e., a space-time formulation);
2. Semi-discretize the weak form in time by means of a dG(r) scheme. Here, use as polynomial degree in time $r = 0$ and $r = 1$, respectively.

Discussion of exercises: Dec 14, 2015