Finite Element Methods for Flow Problems

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Below there are some errors found in the book. If you see some other problems, please contact Antonio Huerta.

- The inequality in Theorem 1.2 (page 27) should be

  $$\|u_0 - u_0^h\|_1 \leq \frac{\gamma_1}{\alpha} \min_{v^h \in \mathcal{V}^h} \|u_0 - v^h\|.$$

  Similarly, equation (1.35) should read

  $$\|u_0 - u_0^h\|_1 \leq C(u_0) \frac{\gamma_1}{\alpha} h^p.$$

- The first equation in page 154 should be

  $$u^\varepsilon(x,t) = u_r + \frac{1}{2}(u_l - u_r)\left[1 - \tanh\left(\frac{(u_l - u_r)(x - \sigma t)}{4\varepsilon}\right)\right].$$

- In equation (4.15) the second component of the flux vectors should be $\rho \boldsymbol{v}\, v_i + p\mathbf{e}_i$, where $\mathbf{e}_i$ is the i-th vector of the standard basis in $\mathbb{R}^n$. Therefore, the equation should be written as follows:

  $$\mathbf{U} = \begin{pmatrix} \rho \\ \rho \boldsymbol{v} \\ \rho E \end{pmatrix}, \ \mathbf{F}_i = \begin{pmatrix} \rho v_i \\ \rho \boldsymbol{v}\, v_i + p\mathbf{e}_i \\ (\rho E + p) v_i \end{pmatrix}, \ i = 1, \ldots, \mathrm{n_{sd}}, \ \text{and } \mathbf{B} = \begin{pmatrix} 0 \\ \rho \boldsymbol{b} \\ \boldsymbol{v} \cdot \rho \boldsymbol{b} \end{pmatrix}.$$

- In Remark 4.4, vectors $\mathbf{F}_1$ and $\mathbf{F}_2$ should be

  $$\mathbf{F}_1 = \begin{pmatrix} \rho v_1 \\ \rho v_1^2 + p \\ \rho v_1 v_2 \\ H \rho v_1 \end{pmatrix} \quad \text{and} \quad \mathbf{F}_2 = \begin{pmatrix} \rho v_2 \\ \rho v_1 v_2 \\ \rho v_2^2 + p \\ H \rho v_2 \end{pmatrix}.$$

  There is also an error in the definition of matrix $\mathbf{A}_2$: the last coefficient should be γv_2 instead of γv_1.

- In section 4.3.3, specifically in the condition for the existence of a wave-like solution, $\mathbf{I}$ is the identity matrix of order $\mathrm{n_{sd}} + 2$.

- Second term in the integral equation just above equation (4.27) should be

  $$\int_\Omega \left(\frac{\partial \mathbf{W}}{\partial x_k}\right)^T \mathbf{F}_k(\mathbf{U})\, d\Omega.$$

- For the example described in section 5.6.2, velocity field should be

  $$\boldsymbol{a} = (-y + 0.5, x - 0.5).$$