Errata of the book


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B. Emek Abali

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Changes in newer versions

The newer version of FEniCS started to use a slightly different declarations. For the 2018 version, we need to import as follows:

```python
from dolfin import *
from ufl import indices
```

Also `print` has been changed such that we need to write

```python
a, b = 5, 12.3
print('a = %g and b = %g ' % (a, b))
```

Some changes are also for the `cells` and `facets` list as well as the infinitesimal volume and surface elements such that the number of Gauss points are directly set within the construction as follows:

```python
cells = MeshFunction('size_t', mesh, 3, 0) # third argument is 3 for 3D elements
facets = MeshFunction('size_t', mesh, 2, 0) # fourth argument sets all the values 0
dA = Measure('ds', domain=mesh, subdomain_data=facets, metadata={'quadrature_degree': 2})
dV = Measure('dx', domain=mesh, subdomain_data=cells, metadata={'quadrature_degree': 2})
```

The tensor representation by using `uflacs` is suggested for many problems as well:

```python
solve(Form==0, u, bc, J=Gain, solver_parameters={"newton_solver":{},
  "linear_solver": "mumps", "relative_tolerance": 1e-3 },
  form_compiler_parameters={"cpp_optimize": True, "representation": "uflacs"})
```

Also constructing mixed function spaces has been changed. The mixed function space for 2D problems, for example the following code snippet

```python
mesh = RectangleMesh(Point(0.0, 0.0), Point(100, 10), 50,5)
Scalar = FunctionSpace(mesh, 'P', 1)
Vector = VectorFunctionSpace(mesh, 'P', 1)
Space=MixedFunctionSpace([Scalar, Vector])
```

needs to be changed as follows
In the case of a 3D example, it is analogous

Moreover, every Expression needs to know the degree for form functions

Typos

Below is a hopefully complete list of typos and mistakes in the text:

The block comment is missing on the lines 1 and 2 of the code on pages 12, 24, and 33. It should be like

On page 19, after Eq. (1.55) “The Euler–Almansi strain...”

On page 21, it should be “...by using \( \rho = \rho_0 / J \), we will satisfy...”

On page 83, the unit in Eq. (1.259) had to be m^2/s.

On page 99, after 1.9 Fluid Structure Interaction “...we need to use the so-called arbitrary Euler–Lagrange frame...”

On page 102, Eq. (1.304) should be

\[
\frac{d\mathbf{v}}{dt} = \left( \frac{dx_1}{dx_1} \frac{dx_2}{dx_2} \frac{dx_3}{dx_3} \right) \mathbf{v} = \frac{\partial w_k}{\partial x_k} \mathbf{v}.
\]

On page 103, Eq. (1.308) should be

\[
\int_\Omega \left( \frac{\partial w_k}{\partial x_k} \delta p + \frac{\partial v_i}{\partial x_i} \delta p + w_i \frac{\partial \delta p}{\partial x_i} \right) dv - \int_{\Gamma_N} w_i \delta p n_i dv.
\]

On page 148, in Eq. (2.147) fourth term should be corrected as

\[
\ldots \rho_0 (\eta - \eta_0) \delta T \ldots
\]

also on 98th line of the corresponding code on page 152.

On page 168, end of Eq. (3.2) should be corrected as

\[
(\mathbf{v}) = \cdots = \frac{\partial v_i^e}{\partial x_i} dv.
\]

On page 202, \( a = \pi r^2_c \).

On page 216, Eq. (3.120) should be

\[
\frac{\partial \rho u}{\partial t} - \frac{\partial}{\partial x_j} (- v_j \rho u - q_j) - \rho r = \Gamma,
\]
On page 254, Eq. (3.242) should be

\[ \cdots \Rightarrow \tilde{s}_{ijk} = -\tilde{S}_{kji} \cdots \]

leading to

\[ d\tilde{\sigma}_{ij} = \cdots - \tilde{S}_{kji} dB_k \]

in Eq. (3.246) as well as

\[ \tilde{\sigma}_{ij} = \cdots - \tilde{S}_{kji} B_k \]

in Eq. (3.248).