Publ. RIMS Kyoto Univ. **48** (2012), 475–476
DOI 10.2977/PRIMS/76

Errata to "On the Stokes Equation with the Leak and Slip Boundary Conditions of Friction Type: Regularity of Solutions"

(Publ. RIMS Kyoto Univ. 40 (2004), 345–383)

by

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In Lemma 4.2 of the above paper, I mistakenly stated that the inequality

$$(*)\qquad \int_{S_R} |(D_h^i g)\varphi|\, dy' \le C(R)\|g\|_{00,S_1}\|\nabla\varphi\|_{Q_R}$$

holds true. Actually, T. Kashiwabara has given a counterexample (private communication). This mistake affects inequality (4.19). Consequently, it also affects Theorems 1.1 and 1.2, and Lemmas 4.1 and 5.2. For that reason, the proofs of the original versions of those results are incomplete. I am not able to complete those proofs under the original assumptions at present. However, instead, I am able to prove the existence of strong solutions together with a priori estimates under a stronger assumption. More precisely,

- in Theorems 1.1 and 1.2, the assumption $g \in H^{1/2}(\Gamma)$ should be replaced by $g \in H^1(\Gamma)$, and the a priori estimate should read

$$\|u\|_{H^2(\Omega)^N} + \|p\|_{H^1(\Omega)} \le C(\|f\|_{L^2(\Omega)^N} + \|g\|_{H^1(\Gamma)} + \|u\|_{H^1(\Omega)^N} + \|p\|_{L^2(\Omega)}).$$

- Furthermore, in Lemmas 4.1 and 5.2, the assumption $g \in H^{1/2}(\Gamma)$ should be replaced by $g \in H^1(\Gamma)$, and the a priori estimate should read

$$\|u_\varepsilon\|_{H^2(\Omega)^N} + \|p_\varepsilon\|_{H^1(\Omega)} \le C(\|f\|_{L^2(\Omega)^N} + \|g\|_{H^1(\Gamma)} + \|u_\varepsilon\|_{H^1(\Omega)^N} + \|p_\varepsilon\|_{L^2(\Omega)}).$$

Those facts can be verified largely in a similar manner to the original proofs, using, instead of $(*)$,

$$(**)\qquad \int_{S_R} |(D_h^i g)\varphi|\, dy' \le C(R)\|g\|_{H^1(S_1)}\|\nabla\varphi\|_{Q_R},$$

Communicated by H. Okamoto. Received July 30, 2011.

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which is valid for $g \in H_0^1(S_1)$. The inequality $(**)$ can be derived by examining the original proof of Lemma 4.2.

Last but not least, it is noteworthy that

$$\left| \int_{S_R} (D_h^i g) \varphi \, dy' \right| \leq C(R) \|g\|_{00,S_1} \|\nabla \varphi\|_{Q_R}$$

holds for $g \in H_{00}^{1/2}(S_1)$, which is also a conclusion from Lemma 4.2. Therefore, the results of Section 6 are all true.