Corrigendum

Corrigendum to "Noncoercive Perturbed Densely Defined Operators and Application to Parabolic Problems"

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In the article titled "Noncoercive Perturbed Densely Defined Operators and Application to Parabolic Problems" [1], there was an error in Theorem 8. The operator $L : X \supseteq D(L) \to X^*$ is assumed to be linear, closed, densely defined, and monotone. However, it is required to replace this assumption on L by the condition that $L : X \supseteq D(L) \to X^*$ is linear maximal monotone. It is known due to Brèzis (cf. Zeidler [2, Theorem 32. L, p.897]) that every linear maximal monotone operator is densely defined and closed. However, the converse is not generally true unless L^* is monotone. In addition to conditions on S in Theorem 8 in [1], monotonicity assumption on S (with $S(0) = 0$) is required. The condition $\langle Lx + Sx, x\rangle \geq -d\|x\|^2$ for all $x \in D(L)$ is not required as it is automatically satisfied with $d = 0$ because of monotonicity of L and S with $(L + S)(0) = 0$. As a result, Theorem 8 in [1] is restated and replaced by Theorem 1 as follows.

Theorem 1. *Let $L : X \supseteq D(L) \to X^*$ be linear maximal monotone and $S : X \supseteq D(S) \to X^*$ be quasibounded demicontinuous and monotone of type (M) with $D(L) \subseteq D(S)$. Assume, further, that there exist $\alpha > 0$ and $\mu \geq 0$ such that exactly (i) or (ii) of the following conditions holds.*

(i) $\|Lx + Sx\| \geq \alpha\|x\| - \mu$ *for all* $x \in D(L)$.

(ii) *There exists* $\phi : [0, \infty) \to (-\infty, \infty)$ *such that* $\phi(t) \to \infty$ *as* $t \to \infty$ *and*

$$\|Lx + Sx\| \geq \phi(\|x\|)\|x\| \quad \forall x \in D(L). \tag{1}$$

Then $L + S$ is surjective.

The proof of Theorem 1 is completed by incorporating the following changes in the proof of Theorem 8 in [1]. For each $\varepsilon > 0$, let L_ε denote the Yosida approximant of L. It is well-known that $L_\varepsilon : X \to X^*$ is bounded, continuous, and monotone.

(a) In equation numbers (54) and (55), L should be replaced with L_ε and J should be replaced with ψ in (55). In equation numbers (57), (58), (59), (60), (62), (63), and (64), L should be replaced with L_ε.

(b) On lines numbers 8 and 9 from below (right column) on page 8, L should be replaced with $L_{\varepsilon n}$.

(c) The text on lines 1, 2, and 3 from below on page 8 (right column) should be deleted, Corollary 9 and its proof in [1, p.9] should be deleted, and the text reading "The following corollary gives a characterization of linear maximal monotone operator in separable reflexive Banach space" should be deleted. In addition, the text reading "It is worth noticing that Brèzis proved (i) in arbitrary reflexive Banach space provided that L^* is monotone and (ii) holds. As a result, Corollary 9 is an improvement of the result of Brèzis when X is separable" should be deleted.

In the abstract, the text reading "A new characterization of linear maximal monotone operator $L : X \supseteq D(L) \to X^*$ is given as a result of surjectivity of $L + S$, where S is of type (M) with respect to L" should be deleted.

References

[1] T. M. Asfaw, "Noncoercive perturbed densely defined operators and application to parabolic problems," *Abstract and Applied Analysis*, vol. 2015, Article ID 357934, 11 pages, 2015.

[2] E. Zeidler, *Nonlinear Functional Analysis and Its Applications*, Springer-Verlag, New York, NY, USA, 1990.