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Erratum to “On homological classification of pomonoids by regular weak injectivity properties of S-posets”

Erratum

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Abstract: The original version of the article was published in Central European Journal of Mathematics, 2007, 5(1), 181–200, DOI: 10.2478/s11533-006-0036-3. Unfortunately, the original version of this article contains a mistake: in Theorem 5.2 only conditions (i) and (ii) (and not (iii)) are equivalent. We correct the theorem and its proof.

MSC: 06F05, 20M30

Keywords: Ordered monoid • S-poset • Weak injectivity

Theorem 5.2 of [X. Zhang, V. Laan, On homological classification of pomonoids by regular weak injectivity properties of S-posets, Cent. Eur. J. Math., 2007, 5(1), 181–200, DOI: 10.2478/s11533-006-0036-3] and its proof should be the following.

Theorem 5.2.
The following conditions are equivalent for a pomonoid S:

(i) all regularly divisible right S-posets are regularly principally weakly injective,

(ii) for every element $s \in S$ there exist $r, r_1, \dots, r_n, s_1, \dots, s_n, s'_1, \dots, s'_n \in S$ and left po-cancellable elements $c_1, \dots, c_n \in S$ such that

$$\begin{aligned} c_1 s_1 \le r_1 s \le c_1 s'_1 \\ c_2 s_2 \le r_2 s_1 \le r_2 s'_1 \le c_2 s'_2 \\ c_3 s_3 \le r_3 s_2 \le r_3 s'_2 \le c_3 s'_3 \\ \dots \\ c_n s_n \le r_n s_{n-1} \le r_n s'_{n-1} \le c_n s'_n \\ s = s s_n = s s'_n . \end{aligned} \tag{4}$$

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Proof. (i) ⇒ (ii) follows as in the original paper.
(ii) ⇒ (i). Assume that (ii) holds. Let A_S be a regularly divisible right S-poset, $s \in S$, and $f : sS \to A$ an S-poset morphism. Then for s we have inequalities and equalities as in (4). Hence $f(s) = f(s)s_n = f(s)s'_n$. Using regular divisibility of A, there exists $a_1 \in A$ such that $f(s) = a_1 c_n$. Consequently,

$$f(s) = a_1 c_n s_n \leq a_1 r_n s_{n-1} \leq a_1 r_n s'_{n-1} \leq a_1 c_n s'_n = f(s),$$

and so $f(s) = a_1 r_n s_{n-1} = a_1 r_n s'_{n-1}$. Again, by regular divisibility of A, $a_1 r_n = a_2 c_{n-1}$ for some $a_2 \in A$. Thus

$$f(s) = a_2 c_{n-1} s_{n-1} \leq a_2 r_{n-1} s_{n-2} \leq a_2 r_{n-1} s'_{n-2} \leq a_2 c_{n-1} s'_{n-1} = a_1 r_n s'_{n-1} = f(s)$$

and $f(s) = a_2 r_{n-1} s_{n-2} = a_2 r_{n-1} s'_{n-2}$. In this way we finally arrive at $f(s) = a_n r_1 s$ for some $a_n \in A$, i.e. $f = \lambda_{a_n r_1}$. So A is regularly principally weakly injective by Proposition 3.3. □

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