

On Classifying the Posets with Non-negative Quadratic Tits Form

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We continue to study the quadratic Tits form for finite posets, which, for a poset S (without the element 0), is determined by the equality

$$q_S(z) = z_0^2 + \sum_{i \in S} z_i^2 + \sum_{i < j, i, j \in S} z_i z_j - z_0 \sum_{i \in S} z_i.$$

In [2] the authors obtained the complete classification of posets whose Tits form is positive; there was also classified all P -critical posets (i. e. such posets with non-positive Tits form whose all proper subposets have positive ones). In [4] the authors classified all NP -critical posets (i. e. such posets whose Tits form is not non-negative but all proper subsets of which have non-negative ones). The main method under our study is the method of (\min, \max) -equivalence (see [1] – [4]).

The report focuses on the problem of classifying the posets with non-negative Tits form. The main result is the complete classification of such posets.

- [1] V. M. Bondarenko, *On (\min, \max) -equivalence of posets and applications to the Tits forms*, Bull. Taras Shevchenko Nat. Univ. of Kyiv (series: Physics & Mathematics), N1 (2005), pp. 24–25.
- [2] V. M. Bondarenko, M. V. Steepochkina, *(\min, \max) -equivalence of partially ordered sets and the quadratic Tits form*, Trans. Inst. of Math. of NAS of Ukraine, **2**, N3 (2005), pp. 18–58 (in Russian).
- [3] V. M. Bondarenko, M. V. Steepochkina, *(\min, \max) -equivalence of posets and nonnegative Tits forms*, Ukr. Math. J. **60**, N9 (2008), pp. 1349–1359; translation from Ukr. Mat. Zh. **60**, N9 (2008), pp. 1157–1167 (in Russian).
- [4] V. M. Bondarenko, M. V. Steepochkina, *Description of posets critical with respect to the nonnegativity of the quadratic Tits form*, Ukr. Math. J. **61**, N5 (2009), pp. 734–746; translation from Ukr. Mat. Zh. **61**, N5 (2009), pp. 611–624 (in Russian).