On the strongly robust property of toric ideals

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To every toric ideal one can associate an oriented matroid structure, consisting of a graph and another toric ideal, called bouquet ideal. The connected components of this graph are called bouquets. Bouquets are of three types; free, mixed and non mixed. We prove that the cardinality of the following sets - the set of indispensable elements, minimal Markov bases, the Universal Markov basis and the Universal Gröbner basis of a toric ideal - depends only on the type of the bouquets and the bouquet ideal. These results enable us to introduce the strongly robustness simplicial complex and show that it determines the strongly robustness property. For codimension 2 toric ideals, we study the strongly robustness simplicial complex and prove that robustness implies strongly robustness.

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