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
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Quasipositivity Problem for 3-Braids

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Abstract: A braid is called quasipositive if it is a product of conjugates of standard generators of the braid group. We present an algorithm deciding if a given braid with three strings is quasipositive or not. The complexity (the time of work) of our algorithm is $O(n^{k+1})$ where n is the length of the word in standard generators representing the braid and k is the algebraic length of the braid. The algorithm is based on the Garside normal form. The problem of quasipositivity in braid groups is motivated by the topology of plane real algebraic curves (16th Hilbert's problem). In particular, our result can be interpreted as a classification of trigonal real pseudoholomorphic curves on rational ruled surfaces.

Key Words: Braid group, quasipositive braids