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The geometric intersection number of simple closed curves on a surface and symplectic expansions of free groups

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Abstract

For two oriented simple closed curves on a compact orientable surface with a connected boundary we introduce a simple computation of a value in the first homology group of the surface, which detects in some cases that the geometric intersection number of the curves is greater than zero when their algebraic intersection number is zero. The value, computed from two elements of the fundamental group of the surface corresponding to the curves, is found in the difference between one of the elements and its image of the action of Dehn twist along the other. To give a description of the difference symplectic expansions of free groups is an effective tool, since we have an explicit formula for the action of Dehn twist on the target space of the expansion due to N. Kawazumi and Y. Kuno.

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Keywords

Geometric intersection number; Magnus expansions

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