

Title: Isomorphism testing for embeddable graphs through definability

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Abstract: The k -dimensional Weisfeiler-Lehman algorithm, for $k \geq 1$, is a natural and simple combinatorial algorithm attempting to decide whether two given graphs are isomorphic.

In this paper, we show that for every surface S (orientable or non-orientable) there is a $k \geq 1$ such that the k -dimensional WL-algorithm succeeds to decide isomorphism of graphs embeddable in S . To prove this, we use a close connection between the WL-algorithm and definability in certain finite variable logics that has been established by Cai, Fürer, and Immerman (1992). Our result answers a question of Immerman and Lander (1990).