1024-68-75   **Jarkko Kari*** (`jkari@utu.fi`), Department of Mathematics, University of Turku, FIN-20014 Turku, Finland. *A new undecidability proof for the tiling problem: The tiling problem is undecidable both in the Euclidean and in the hyperbolic plane.* Preliminary report.

The tiling problem asks whether the plane can be tiled with copies of a given finite collection of prototiles. The tiling problem was proved algorithmically undecidable by R.Berger in 1966. We give a new proof of this fact, based on a reduction from the mortality problem of Turing machines, proved undecidable by Hooper in 1966. We first reduce the mortality problem of Turing machines into the mortality problem of rational affine transformations, using a standard technique to simulate Turing machines by 2-dimensional affine maps. Then the mortality of affine transformations is reduced to the tiling problem using a simulation of the affine transformations on tiles.

The same method is then used to prove the tiling problem undecidable in the hyperbolic plane. (Received December 29, 2006)