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Killian Meehan, Andrei Pavlichenko and Jan Segert* (segertj@missouri.edu),
Mathematics Department, 202 Math. Sci. Bldg., University of Missouri, Columbia, MO 65211. *On
the Structural Theorem of Persistent Homology.*

We study the categorical framework for the computation of persistent homology, without reliance on a particular computational algorithm. The computation of persistent homology is commonly summarized as a matrix theorem, which we call the Matrix Structural Theorem. Any of the various algorithms for computing persistent homology constitutes a *constructive* proof of the Matrix Structural Theorem. We show that the Matrix Structural Theorem is equivalent to the Krull-Schmidt property of the category of filtered chain complexes. We separately establish the Krull-Schmidt property by abstract categorical methods, yielding a novel *nonconstructive* proof of the Matrix Structural Theorem.

These results provide the foundation for an alternate categorical framework for decomposition in persistent homology, bypassing the usual persistence vector spaces and quiver representations. (Received September 14, 2017)