

PGL₂ Webs on the Torus, the Punctured Torus, and the T-Shirt

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Abstract

The Kauffman bracket skein algebra (KBSA) of a 3-manifold M — defined as the free algebra generated by unoriented framed links in M modulo the Kauffman relations — is generally an object of interest in the study of quantum topology. One particular modification to this construction is to consider instead the free algebra generated by trivalent graphs embedded in M modulo a different set of relations. This algebra is called the graph skein algebra of M . In this paper we describe bases and multiplication in the graph skein algebras of the torus, the punctured torus, and the tee-shirt. We also prove that the graph skein algebras of the punctured torus and tee-shirt embed into their respective KBSAs, but that the torus does not. Notably, this the torus is the first known example for which this occurs.