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William J Martin* (martin@wpi.edu), Department of Mathematical Sciences, 100 Institute Road, Worcester Polytechnic Institute, Worcester, MA 01609. *Scaffolds: A graph-based system for computations in Bose-Mesner algebras*. Preliminary report.

Let (X, \mathcal{R}) be an association scheme with Bose-Mesner algebra \mathbb{A} . Suppose we are given

- a (di)graph $G = (V(G), E(G))$
- a subset $R \subseteq V(G)$ of “red” nodes
- a map from edges of G to matrices in our Bose-Mesner algebra:
 $w : E(G) \rightarrow \mathbb{A}$ (edge weights), and
- a subset $F \subseteq V(G)$ of nodes and a function $\psi : F \rightarrow X$.

The *scaffold* $S(G; R, F, \psi, w)$ is defined as the quantity

$$S(G; R, F, \psi, w) = \sum_{\substack{\varphi: V(G) \rightarrow X \\ (\forall a \in F)(\varphi(a) = \psi(a))}} \prod_{\substack{e \in E(G) \\ e = (a, b)}} w(e)_{\varphi(a), \varphi(b)} \bigotimes_{r \in R} \widehat{\varphi(r)}.$$

When G is small, these are naturally encoded as simple diagrams and operations on these diagrams naturally represent certain transformations on scaffolds. Following work of Terwilliger, Dickie and Suzuki, we explore the known results on association schemes obtained using this language and offer a unified set of rules and lemmas along with several new results which utilize this technology. (Received August 15, 2016)