1077-05-1062 **Thomas Tucker*** (ttucker@colgate.edu), Colgate University, Hamilton, NY 13346, and **Ergun Akleman**, **Jianer Chen** and **Jonathan Gross**. *Rotation systems for* 2*-complexes in orientable* 3*-manifolds.* Preliminary report.

Given a finite simplical 2-complex K embedded in an oriented 3-manifold, a right-hand rule assigns to each directed edge e of K a cyclic order $\rho(e)$ of the incident 2-simplices, such that $\rho(e^-) = \rho(e)^{-1}$. This $3D$-rotation system induces a planar (usual) $2D$-rotation system for the link $L(v)$ of each vertex v. Conversely, an assignment of a cyclic order $\rho(e)$ to each directed edge which induces a planar embedding of $L(v)$ for each v, defines a thickening T_ρ of K, that is, a regular neighborhood of K in an oriented 3-manifold. Unlike the case for graphs, T_ρ may have non-sphere boundary components, so there is no canonical closed 3-manifold associated with ρ. Nevertheless, the boundary components of T_ρ can be constructed, similar to face-tracing for a $2D$-rotation, so it can be decided whether a given 2-complex has a thickening where all boundary components are spheres. Combining this with the Rubinstein-Thompson sphere recognition algorithm, we can decide whether a given 2-complex has a cellular embedding in the 3-sphere. This approach relates to work of Neuwirth (1968); Archdeacon, Bonnington, Richter, Šìràň, (2002); Repovš, Brodskij, Skopenkov (1999); and Lasheras (1999). (Received September 15, 2011)