Meeting: 1003, Atlanta, Georgia, SS 9A, AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates, I

1003-52-1039 **Sandra Gregov*** (sand_g@yorku.ca), 1309 Wilson Avenue, Apt. 200, Toronto, Ontario M3M 1J4, Canada, and **Walter Whiteley** and **Joseph Aiken**. *Tracking Motions of Cellular Leaves.* Preliminary report.

A *cellular leaf* is a general planar framework formed by dissecting a simple polygon with vertices and edges such that the interior faces are triangles and parallelograms, with the possibility of cross braces in the parallelograms. Our central theorem states that a cellular leaf is rigid if and only if its associated zone graph is connected. This extends the results of Bolker and Crapo for grids formed by a parallelogram decomposed into parallelograms.

We will demonstrate the correspondence between motions of a *cellular leaf* and motions of an associated much simpler framework called the *zone star*, developed from the zone graph. Moreover, from the construction of a zone star, we know that a zone star of a cellular leaf is flexible if and only if its associated zone graph is disconnected. Moreover, given a disconnected zone star $\vec{z}_{\mathcal{L}(p)}$, any continuous motion $m(t)$, altering directions or lengths of a disconnected component, will result in a new zone star $\vec{z}_{\mathcal{L}(m(t))}$ yielding a new cellular leaf $\mathcal{L}(m(t))$, captured by $m(t)$. Thus, the zone star becomes a vital geometric and combinatorial tool for tracking all possible motions in any cellular leaf. (Received October 03, 2004)