1096-58-125 **James Damon** and **Ellen Gasparovic*** (ellen.gasparovic@gmail.com). *Skeletal linking structures for multiple-region analysis.*

Consider a collection of distinct compact regions $\{\Omega_i\}$ in $\mathbb{R}^{n+1}$ with piecewise smooth boundaries, where the regions are allowed to intersect on their boundaries (in a generic way). For example, in 2D and 3D medical images, we encounter complexes of objects such as organs, glands, arteries, bones, etc. that may be modeled by such a collection. The goal of this talk is to introduce a skeletal linking structure for the configuration of regions which captures the regions' individual shapes as well as the "positional geometry" of the collection. This includes both the geometric properties of the individual regions as well as global geometry reflecting any relations between the regions. The linking structure builds on earlier work of Damon in which, for a single compact region with smooth boundary, he developed the notion of a "skeletal structure" as a generalization of the Blum medial axis. We introduce a number of volumetric invariants measuring features of a given collection, particularly the relative closeness and relative significance of the individual regions. These are then used to construct a "tiered graph," which provides a means of obtaining a hierarchy among the regions based on the orderings of significance and closeness. (Received August 01, 2013)