1077-68-2114 **Primoz Skraba*** (primoz.skraba@ijs.si), Artificial Intelligence Laboratory, Jamova 39, 1000 Ljubljana, Slovenia. *Computing Well Diagrams for Vector Fields in $\mathbb{R}^n$.*

The well diagram is related to, but different from the more well-known persistence diagram: given a mapping $f : \mathbb{X} \to \mathbb{Y}$ and a subspace $A \subseteq \mathbb{Y}$, the well diagram encodes the robustness of the homology of $f^{-1}(A)$ with respect to perturbations of the mapping f. Except for a few special cases, there is no general method known to compute a well group. In this talk, I will focus on computing the well diagram for a vector field: mappings with the form $f : \mathbb{R}^n \to \mathbb{R}^n$ in $\mathbb{R}^n$ where $A = \{0\}$. The well diagram is interesting because it is both a quantitative and a stable property of the zeros of the vector field, which are also the critical points of the multivariate function. In this talk, I will show how the rank of a well group is determined by the topological degree of an appropriate mapping, leading directly to a fast algorithm. With the fast algorithm in hand, I will show examples of computed well diagrams for various vector fields in different dimensions as well as discuss extensions to time-varying scenarios and applications of these techniques to other fields, such as visualization. (Received September 21, 2011)