1086-60-1476 **Maxim J. Goldberg** (mgoldber@ramapo.edu), 505 Ramapo Valley Road, Mahwah, NJ 07430, and **Seonja Kim*** (seonja777@hotmail.com). *Using a dyadic decomposition of the time until diffusion densities overlap to define a new diffusion distance.* Preliminary report.

Diffusion distances have been successfully used in applications such as data organization and approximately isometric embedding of high dimensional data in low dimensional Euclidean space. One recent proposal for a diffusion distance is to define separation between two points as the first *time* that the diffusion densities "spreading" from the points overlap sufficiently. In this work, we consider two "reactive" elements, each diffusing from one of two data points under the action of successive powers of a Markov matrix. When a particle of one of the elements meets a particle of the other element, we view them as bonding together (and remaining bonded from that tick of the clock onward). Eventually sufficient overlap of Dirac densities spreading from the two points corresponds to cumulatively sufficient bonding of the two elements. We define two (non-linear) operators–the Merge and the Reduce operators–to keep track of bonded and unbonded elements in time. We then use these operators to construct a dyadic decomposition of the time of bonding. This decomposition allows us to define an efficiently computable weighted average, over paths with total probability more than a specified threshold, of the time until sufficient density overlap occurs. (Received September 22, 2012)