1120-00-32 **Cheng Cheng*** (cheng.cheng@knights.ucf.edu), 3919 Whittington DR, Orlando, FL 32817.
Spatially distributed sampling and reconstruction.

A spatially distributed system contains a large amount of agents with limited sensing, data processing, and communication capabilities. We introduce a graph structure for such distributed sampling and reconstruction systems (DSRS) by coupling agents in a spatially distributed system with innovative positions of signals. A fundamental problem in sampling theory is the robustness of signal reconstruction in the presence of sampling noises. For a distributed sampling and reconstruction system, the robustness could be reduced to the stability of its sensing matrix. We split a distributed sampling and reconstruction system into a family of overlapping smaller subsystems, and we show that the stability of the sensing matrix holds if and only if its quasi-restrictions to those subsystems have uniform stability. This new stability criterion could be pivotal for the design of a robust distributed sampling and reconstruction system against supplement, replacement and impairment of agents. We also propose an exponentially convergent distributed algorithm for signal reconstruction, that provides a suboptimal approximation to the original signal in the presence of bounded sampling noises. (Received January 26, 2016)