1154-34-800 **Yun Kang*** (yun.kang@asu.edu), **Tao Feng**, **Jun Chen**, **Zhipeng Qiu** and **Daniel Charbonneau**. *Dynamics of task allocation in social insect colonies: Scaling effects of colony size versus work activities.* Preliminary report.

One of the key questions in study of social animals relates to the mechanisms underlying their organization of work. In this work, we propose an adaptive modeling framework on task allocations by incorporating variations both in task performance and the related metabolic rates. We study the scaling effects of colony size on the resting probability as well as the task allocation. We also numerically explore the effects of stochastic noise on the task allocation of social insect colonies. Our theoretical and numerical results show that: (a) changes in colony size can regulate the probability of the colony resting and the allocation of colony task, and the direction of regulation is related to the nonlinear metabolic scaling effects of tasks; (b) an enhanced response threshold can result in the appearance of a periodic solution. In this case, we observed interesting bubble phenomena in the task allocation of social insect colonies for the first time; and (c) stochastic noise causes the probability of colony resting and the allocation of colony task to fluctuate within a range, and the amplitude of the fluctuation is positively correlated with the intensity of the noise. (Received September 10, 2019)