1145-05-1205 **N. Jonoska*** (jonoska@mail.usf.edu), **J. Durand-Lose** and **H.J. Hoogeboom**. *The Computational Power of Deterministic Tile Self-assembly.*

Complex DNA molecules that can build large two-dimensional arrays are modeled by square Wang tiles with colored edges. The assembly process is simulated by placing Wang tiles, one after another on the integer lattice $\mathbb{Z}^2$, where at least one edge between neighboring tiles has a matching color. The systems where assemblies with mismatched colors are allowed are considered 'non-cooperative'. We consider non cooperative binding, in deterministic (called *confluent*) tile self-assembly systems (TAS) and prove the standing conjecture that such systems do not have universal computational power. We observe that a confluent TAS has at most one maximal producible assembly, (an assembly that cannot grow further) $\alpha_{\max}$ and provide a characterization for $\alpha_{\max}$. To a given $\alpha_{\max}$ we associate a finite labeled directed graph such that every path visits at most two cycles, called *quipu*. We show that the union of all labels of paths in a quipu equals $\alpha_{\max}$, therefore giving a finite description for $\alpha_{\max}$. This finite description implies that $\alpha_{\max}$ is a union of semi-linear subsets of $\mathbb{Z}^2$ and therefore such systems cannot have universal computational power. (Received September 20, 2018)