1135-05-45          **Eva Czabarka\*** (czabarka@math.sc.edu), **Laszlo A. Szekely** and **Stephan Wagner**. *A tanglegram Kuratowski theorem.* Preliminary report.

A tanglegram $(L, R, M)$ in $n$ leaves is a pair of rooted binary trees $L, R$, each with $n$ leaves and a matching $M$ between the leaves. Two tanglegrams are the same if there is a root-preserving tree isomorphism between the left trees and a root preserving isomorphism between the right trees that maps matching edges to matching edges. A tanglegram layout is a drawing where the to trees are drawn as plane trees such that the leaves face each other, and matching edges are drawn as straight lines (so only matching edges are allowed to cross). The crossing number of a layout is the number of (unordered) pairs of edges that cross, the tangle crossing number of a tanglegram is the minimum crossing number over all of its layouts. Biologists use the tangle crossing number to estimate relevant quantities (e.g. number of times when a parasite switched hosts, where the two trees are the phylogenetic trees of host and parasite and the matching is given by which parasite exploits which host); determining the tangle crossing number is known to be NP hard. We show a Kuratowski-type theorem for tanglegrams, namely, that a tanglegram is nonplanar precisely when it contains one of two nonplanar 4-leaf tanglegrams as induced subtanglegrams. (Received July 02, 2017)