1116-92-2257 **Michael Marcondes de Freitas*** (marcfrei@math.ku.dk), Department of Mathematical Sciences, University of Copenhagen, Universitetsparken 5, 2100 Copenhagen Ø, Denmark, and **Elisenda Feliu** and **Carsten Wiuf**. *Obtaining Qualitative Properties of Chemical Reaction Networks from Simplified Models.*

We present two graphical procedures to simplify reaction networks, namely, removing so-called intermediates and catalysts. These are shown not to break known necessary or sufficient conditions for *persistence*, the property that species concentrations remain bounded away from zero as long as they were all positive in the beginning. For cascades of a large class of post-translational modification (PTM) systems, this approach allows us to prove that persistence is equivalent to easily checkable strong connectivity properties of the underlying network.

To briefly illustrate the scope and reach of our method, consider a one-site phosphorylation process as modelled by the reaction network

$$\begin{aligned} E + S_0 &\leftrightarrow ES_0 \rightarrow E + S_1 \\ F + S_1 &\leftrightarrow FS_1 \rightarrow F + S_0\,, \end{aligned}$$

where S_0 and S_1 are nonphosphorylated and phosphorylated forms of a protein, E and F enzymes, and ES_0 and FS_1 intermediate steps. Persistence for this PTM system may be understood via our model simplification approach as a consequence of strong connectedness of its underlying substrate model $S_0 \leftrightarrow S_1$.

The removal of intermediates is also shown not to break known conditions for global convergence. (Received September 22, 2015)