Use in multi-commodity flow graphs

Elimination of variables irrelevant for a "higher level" question is not only limited to the considered task of obtaining a cargo model from a stowage model. As another example, consider eg. a multi-commodity flow graph $G = (V, E)$, where commodities c_1 to c_k flow through the graph from sources ($S \subseteq V$) to sinks ($T \subseteq V$), and each edge have limits for each commodity as well as a joint limit. For a number of applications it would be of interest to know how much can flow from the source-nodes to the sinks, or more specifically, how the amount/number of each commodity at the sinks (x_{t,c_i} for all $t \in T$ and $1 \leq i \leq k$) depends on the amount/number of the commodities at the sources (x_{s,c_i} for all $s \in S$ and $1 \leq i \leq k$)[1]. For this purpose, we are uninterested in the amount/number of each commodity that flows at each edge of the graph, and the variables denoting this could/would/should/... therefore be eliminated from the original model/system describing the multi-commodity flow problem.

[1] Notice that in this scenario, the demand of each commodity is not fixed/given.