

Metabolic networks from (M, R) systems and autopoiesis perspective

Zaretzky, Alba N.

Letelier, Juan C.

This paper is the first one of a series devoted to the analysis of metabolic networks. Its aim is to establish the theoretical framework for this analysis. Two different lines of research are considered: the one about metabolism-repair systems ((M,R)), introduced by Robert Rosen as an abstract representation of cell metabolic activity, and the concept of autopoiesis developed by Humberto Maturana and Francisco Varela. Both concepts have been recently connected by Letelier et al., determining that the set of autopoietic systems is a subset of the set of general abstract (M, R) systems. In fact, every specific (M, R) system is an autopoietic one, being the boundary, which specifies each system as a unity, the main element of autopoietic systems which is not formalized in Rosen's representation. This paper introduces the definition of boundary - a physical boundary and a functional one - for (M, R) systems in the context of a representation using category theory. The concept of complete (