Cyclic Scheduling of Multimodal Processes in Mesh-like Environment

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Abstract

A process composed of sequences of local cyclic The theoretical prediction of the behavioral properties of periodic structures is less difficult than in the case of nonperiodic ones. That is because all the information needed to describe the entire structure is given by the elementary substructure itself and by the manner it repeats in the whole periodic structure. So, only a small portion of the structure (which includes the repeating substructure) needs to be considered to obtain the properties of the whole periodic structure. In that context, the contribution provides the discussion of some system periodicity issues, and is aimed at modeling and evaluation of relationships linking the system structure features with required system’s functioning.

1. Introduction

A periodic structure may be defined as an assembly of an object that repeats regularly in space [4]. In other words, the periodic structure is made of a basic object that repeats at precise intervals in space and the resultant structure possesses regularity. Examples of periodic structures include scaffold structures or building frameworks where the constituent objects (e.g. routes and intersections, e.g. the Manhattan quarter [http://maps.google.com] are regularly distributed in space and all have the same size.

Assuming that in the case of periodic structure systems, only a single computational sample needs to be studied because the sample precisely describes the periodic system behavior, we are looking for a method allowing us to predict the behavioral properties of periodic structures, which in turn allow us to design, understand, and optimize the structures prior to their final application. In order to illustrate an idea standing behind of that approach let us consider the following question: is it possible to organise street traffic (based on traffic lights) in any city so as to ensure a green wave for each street and in each direction? Looking at Fig. 1 a) which illustrates the mechanism of a green wave, it is easy to observe that the answer is in the affirmative, if we assume regularity of the transport infrastructure (Fig. 1.b).

Fig. 1. Illustration of street traffic implementing a green wave

The considered problem of street traffic organisation, belongs to the group of problems strongly dependent on the structure of the described object (in this case, a city). As it was observed, the symmetrical structure of streets allows to plan a fair (unbiased) system of traffic lights.