Modeling and Control of Weight-Balanced Timed Event Graphs in Dioids

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Résumé en anglais	The class of Timed Event Graphs (TEGs) has widely been studied for the last 30 years thanks to an algebraic approach known as the theory of Max-Plus linear systems. In particular, the modeling of TEGs via formal power series has led to input-output descriptions for which some model matching control problems have been solved. In the context of manufacturing applications, the controllers obtained by these approaches have the effect of regulating material flows in order to decrease internal congestions and intermediate stocks. The objective of this work is to extend the class of systems for which a similar control synthesis is possible. To this end, we define first a subclass of timed Petri nets that we call Balanced Timed and Weighted Event Graphs (B-TWEGs). B-TWEGs can model synchronisation and delays (B-TWEGs contains TEGs) and can also describe some dynamic phenomena such as batching and event duplications. Their behavior is described by some rational compositions of four elementary operators γ n , δ t , μm and βb on a dioid of formal power series. Then, we show that the series associated to B-TWEGs have a three dimensional graphical representation with a property of ultimate periodicity. This modeling allows us to show that B-TWEGs can be handled thanks to finite and canonical forms. Therefore, the existing results on control synthesis, in particular the model matching control problem, have a natural application in that framework.
Notes	
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Liens

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