論 文 の 内 容 の 要 旨

論文題目　Resource Redistribution as Emergent Mechanism of Community Resilience: Short-Term Recovery after Large Scale Disaster（コミュニティーレジリエンスの創発的メカニズムとしての物資再配分：大規模災害後における短期的回復）

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The short-term recovery is an essential part of the large scale disaster mitigation problem. According to the modern state art the main goal of the short-term recovery is to restore the vital life-support system to the minimal operating standards required for human surviving within the minimal time interval. To mitigate aftermath of a large scale disaster cooperation of many cities is required, because the amount of resources initially accumulated in an affected area can be insufficient to recover all the individual components of the vital life-support system. Thereby the implementation of the short-term recovery is directly related to an efficient resource redistribution.

The development of the concept of efficient resource redistribution during the short-term recovery, the corresponding mathematical model, as well as the investigation of characteristic feature of this process under various conditions including possible mechanisms of uncertainty in the information about the state of affected area is the subject-matter of the present thesis. Because the short-term recovery can be categorized as a rescue operation the approach to be developed has to allow for two key factors, humanitarian and rational ones.

Numerical simulation of the resource redistribution governed by the proposed principle demonstrates its high robustness with respect to uncertainty of different types due to the cooperative interaction of cities in the supply process. Namely, this robustness is a consequence of the fact that this resource redistribution is emergent process involving in its implementation many unaffected cities in the region adjacent to the affected area. As a result majority of possible effects that potentially can make the resource redistribution longer are compensated and the duration of the resource redistribution in the most considered situations turns out to be approximately the same. It enables us to

consider the plan of the resource redistribution generated by the propose principle semi-optimal.

Finally the resource supply dynamics governed by the developed approach is compared with the time pattern of the resource supply generated by the corresponding linear programming problem. The results obtained for a system with the completed information about the system state initially available fit each other within a high degree.