琉球大学学術リポジトリ

多様な消費形態および運用を達成する超スマート社会(Society5.0)のための配電系統制御に関する研究

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論文概要

論　文　題　目

"A Study on Control of Distribution System for Super Smart Society (Society 5.0) Towards Diversified Consumption and Operation"

和文題目：「多様な消費形態および運用を達成する超スマート社会(Society5.0)のための配電系統制御に関する研究」

論　文　概　要

Due to the evolution of ICT etc., the advent of "major change era," where social and economic structure change day by day, it increases and complicates domestic and overseas several issues. The need for science and technology innovative promotion for has been recognized that increased in the "5th Science and Technology Basic Plan". The plan proposes "Society 5.0 (Super Smart Society)" as the next generation of society 4.0 (information society). In this society ahead of the rest of the world, it has been suggested that is new values and services are created one after another, in order to create industries of the future and social change. An important infrastructure project for society is mainly focused on electric (energy) infrastructure, and realizing the next generation (smart-grid and microgrid) for building a sustainable society developed is regarded as the top priority, research and demonstration are being actively carried out in recent years.

In this paper, it has been discussed and verified that is the way of smart distribution configuration, its operation, coordinate control with a distribution company and customer for demand response, which will help to realize such "super smart society". In addition, an active smart grid has been proposed to improve the reliability of energy supply, confirmed the possibility of reducing distribution loss and improvement of reliability of energy supply at the time of an accident by power flow simulation. Furthermore, because diversified consumption is an important aspect of the super smart society, introduced multi-objective optimization for expression and decision-making of the diversity of customers. With this multi-objective optimization, customers can flexibly select solutions (smart house design and operation) and proposed voltage coordination control (demand response) of the distribution system considering diversity. Finally, this paper proposes the application of demand response by volt/var control of smart inverter to three phase imbalance problem. Several discussion for approaches leads to solutions and optimization methods have been discussed to achieving super smart society.

氏　名　　重信 颯人