

Development of an Analysis System for Voltage Dip Measures

Background

In line with advancing computerization of consumer equipment in recent years, interest in electric power quality is increasing. State-of-the-art production lines like in the semiconductor industry heavily depend on motors or other devices that employ power electronics, which are very vulnerable to even subtle power fluctuations. So, the equipment now needs to be operated with high power quality. Therefore, good consulting services are expected regarding countermeasures that fit with individual equipment in customers.

Objectives

To develop the tool to analyze the effects of various voltage dip measure at customer

Principal Results

1. The development of an analysis system for voltage dip measures

We developed the analysis system for the customers. The system is based on EMTP.

- (1) The tool, which works on Windows-based PCs, enables you to make an explanation to customers by viewing results shown on the display together with the customer.
- (2) The general voltage dip measures are built in the system. So, the evaluation can be done with or without the measure (Table 1).
- (3) The loads of importance at customer's facilities can be selected from among typical apparatus. We can select static load model or induction motor.
- (4) The system considers the convenience of the parameter setting, earth scheme of a transformer etc.

2. Utilization of the Tool

In supporting consulting services for anti-voltage-dip measures, the tool we developed would be useful, for example, in:

- (1) Assessment of the current status: the effect of voltage dips on customer's existing equipment configuration can be assessed (Figure 2).
- (2) Determining minimum measures required: for every method, costs can be calculated from necessary capacity.

Future Developments

To pursue practicality of the tool, we are continuing with the development of the models of reasonable precision for voltage dip measures and customer facilities compared with actual response results of the customers.

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Reference

Naoki Gibo, 2003, "Development of an Analysis System for Voltage Dip Measures", T03005 (in Japanese)

4. Power Delivery - Cost reduction and ensuring reliability of power delivering

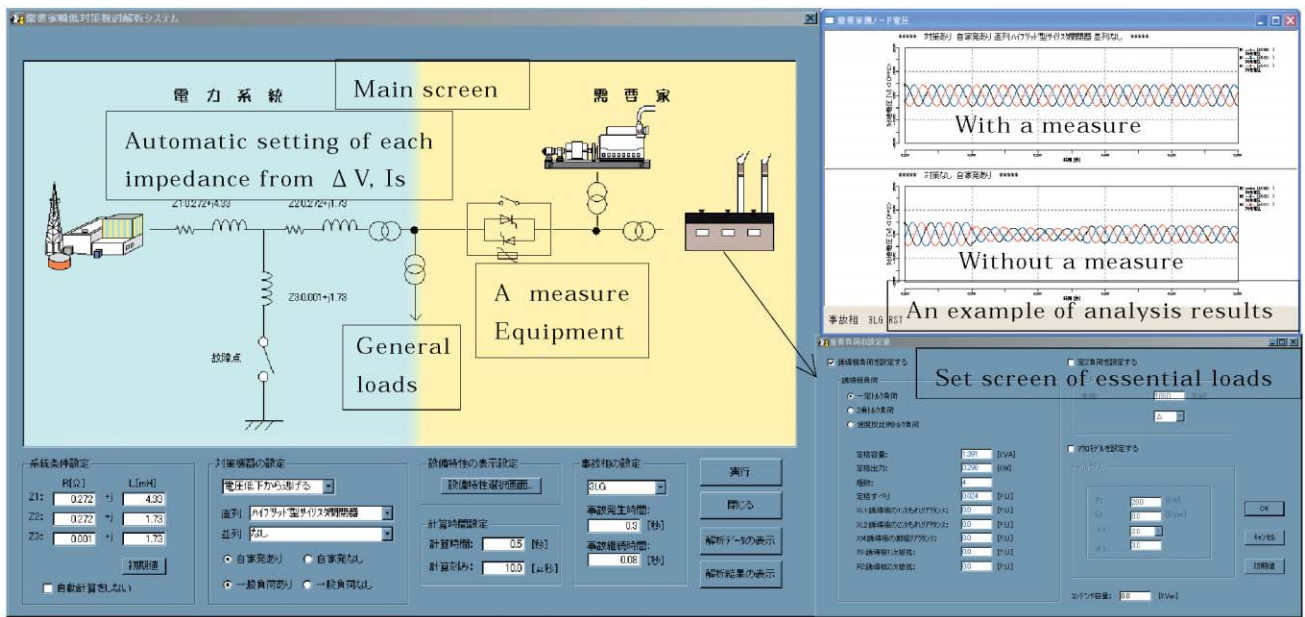


Fig.1 Screen and analysis results of support tool in the application of a kind of voltage

Table 1 The Measures built in the tool

	Anti-voltage-dip measures	The method	Focus of measures
1	UPS	The steady schme	Isolation from the dip
2	High-speed current-limiting circuit breaker + private power facilities	Source exchange by the switch (It shifts to the isolated system)	Escape form the dip
3	HB (hybrid type thyristor switch) + private power facilities	Source exchange by HB switch (It shifts to the isolated system)	
4	HB + Battery system		
5	HB + μ SMES		
6	DVR	Series compensation	Compensation of the dip
7	M - G	Parallel compensation	

SMES: Superconducting Magnetic Energy Storage, DVR : Dynamic Voltage Restorer, M-G : flywheel equipment

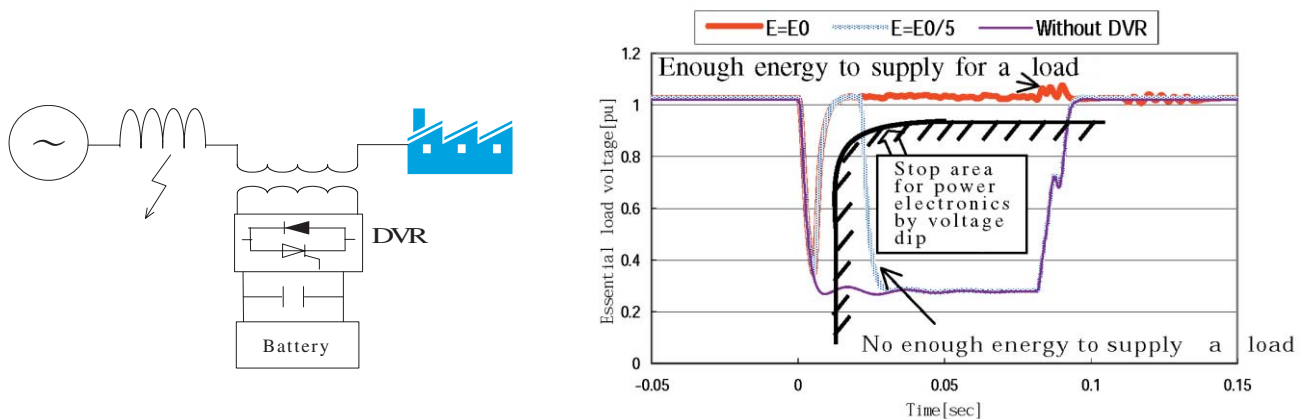


Fig.2 The quantitative evaluation of a voltage dip measure(In the case of DVR).