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Hierarchical Fault Classification Method as a Tool for Analyzing Complex Failures: Application to the Nuclear Power Plant Accidents

Masaya Hagiwara

Nagyoa Institute of Technology, JAPAN
Gokiso-cho, Showa-ku, Nagoya 4668555

Corresponding author's Email: hagiwara.masaya@nitech.ac.jp

Author Note: Masaya Hagiwara, Dr. Eng., is professor of Nagoya Institute of Technology, Department of Mechanical Engineering. His field covers Machine Elements and Plant Engineering. He is a fellow of the Japan Society of Mechanical Engineers, and a member of the Society of Plant Engineers Japan, the Society for Experimental Mechanics, and ASTM International. He is also working as an expert of ISO/TC 2 (Fasteners).

Abstract: This paper deals with a graphical method which can be applicable to analyze the risk and the safety, and to find out the root cause(s) and the necessary action(s) for the accident encountered in the plants. The method is based on Hierarchical Fault Classification (HFC) method where a failure or a series of failures (primary and secondary failures) can be described by a set of the fault modes of 8 hierarchical levels. By using the method proposed, we can easily describe the whole sequence of the accident as a simple diagram. The diagram may help to share the information between experts, and to seek the action to be executed. The diagram can also be used as an overview for the detailed analyses using the conventional techniques such as FTA and FMECA. The application to the accidents at Three Mile Island and Fukushima Daiichi nuclear power plants highlights the advantages of this method.

Keywords: Complex Failure, Failure Assessment, Graphical Method, Plant Accident, Risk Analysis, Hierarchical Fault Classification.