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P2.235 Overview of the Methods developed for Fission Plants Safety relevant to the Safety of Fusion Facilities

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Safety studies for fusion facilities are commonly conducted using codes originally developed for fission reactor accident analysis and adapted to model the fusion-relevant phenomena. Nevertheless there are many “fission developed” methods still not considered in fusion safety assessment which could offer significant advantages in the fusion power commercialization. Along with solving the safety and licensing critical for the fusion power commercialization will be as well the ability to reduce the cost and increase the efficiency of the power production. Among other means these were achieved in the fission power by limiting or even avoiding the conservatism in safety assessment, by improving the methods and use of the state-of-the art tools. There are many reasons for looking into the fission - similar nuclear regulations, the same nuclear safety principles and limits apply, use of mature and proven methods, etc.
The paper will address the following topics
• Experimental programs, Test Matrixes and Data bases
• Computer codes development, verification and validation
• Computer codes assessments
• Conservative or Best Estimate (BE) methodology
• Uncertainty estimation methods
• Phenomena Identification and Ranking Tables (PIRT)
The parallel between the fission and fusion safety approaches and accident analyses methodologies will be drawn. For each of the above topics a brief presentation of the fission historical development followed by an overview of published adaptations of methods and their applications to fusion safety will be reported. The presentation will draw in particular on availability of qualified tools for accidents analyses, use of PIRT, the verification and validation of computer codes by means of separate and integral effect tests and establishing benchmark problems as well on code assessment and development of multi-physics, multi-fluids integrated code systems. These efforts should be aimed at developing a systematic safety demonstration defined by an integrated fusion safety assessment methodology.

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