Nondestructive cable monitoring in nuclear power plants

In a nuclear power plant (NPP) an average of 25,000 cables with a total length of 1,500 km are installed. These cables are partially exposed to harsh environmental conditions such as increased temperature or radiation: under these circumstances, the cable insulation deteriorates, with the risk of cracks and short circuits occurring as a result of premature embrittlement. Within the framework of a EURATOM project funded by the European Union, researchers at Fraunhofer IZFP are looking at how these aging effects can be detected in good time and in a nondestructive manner. The Saarbrücken-based Fraunhofer institute is part of a consortium of 13 partners from Germany, Finland, France, Italy, Poland, and the Czech Republic. Currently, the cables are replaced preventively on the basis of experience, but without reliable information on the actual condition. Thus, the actual condition can vary in a wide range.

Fraunhofer IZFP engineers are studying the advantages in terms of safety and efficiency that could be offered by nondestructive testing when investigating cable insulation. "TeaM Cables" focuses on a terahertz process further developed at Fraunhofer IZFP, which uses high-frequency electromagnetic waves. These examinations could be used to provide information that allows for revision scheduling and timely inspection of the cable insulation. Hence, brittle cables can be replaced promptly while sound cables can stay in operation for many years more. Fraunhofer IZFP is making a significant contribution to increased safety and cost savings – also in the context of nuclear decommissioning – while economy and competitiveness still increase.

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