
**МЕТОДИКИ ЭКСПЕРИМЕНТА
И ВЗРЫВНЫЕ ТЕХНОЛОГИИ.
МОДЕЛИРОВАНИЕ ДИНАМИЧЕСКИХ ПРОЦЕССОВ**

**TEST TECHNIQUES AND EXPLOSIVE TECHNOLOGIES.
SIMULATION OF DYNAMICAL PROCESSES**

**TECHNIQUES AND TECHNOLOGY OF NON-DESTRUCTIVE ANALYSIS
FOR NUCLEAR MATERIAL SECURITY**

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Confirming the presence or absence of a special nuclear material and its configuration, quantity, and properties inside a closed container is one of the most important and challenging tasks facing the international safeguard community. The experimental methodology of nondestructive assay (NDA) uses neutron, gamma or heat emissions from a sample under inspection to determine its mass and isotopic composition. Active probing with particles and photons can provide additional information including, potentially, information about the configuration and distribution of the material of interest. Based on the principal elements of applied nuclear physics, NDA methodology has achieved remarkable success in the past 50 years as a tool in international safeguards, nuclear material verifications and material accountability.

Rapid and unprecedented advances in the field of non-destructive analysis including advances in applied gamma-ray spectroscopy, new calorimetry techniques, and active interrogation with external signature detection using both static radioactive sources and pulsed neutron or gamma sources have added new dimensions and enhanced fidelity to the internationally developed capability to interdict illicit movement of nuclear materials. Novel detector systems increase the sensitivity of many new techniques.

Fast, high precision, radiography using various probes and techniques provide an additional approach exploring static objects for nuclear material security and can be used to diagnose dynamic experiments for fundamental research. Radiographic technique can be applied to inspect the contents of containers, packages and assemblies for global nuclear security applications ranging from conventional baggage inspection, to portal and boarder security and to examine, in detail, the motion of material in high speed dynamic experiments.

In this paper we present examples of a few NDA instruments and measurement methods that were developed at LANL and successfully implemented at domestic and foreign nuclear facilities and used by many organizations and discuss some applications of modern radiography to active interrogation. (LAUR-18-22326)