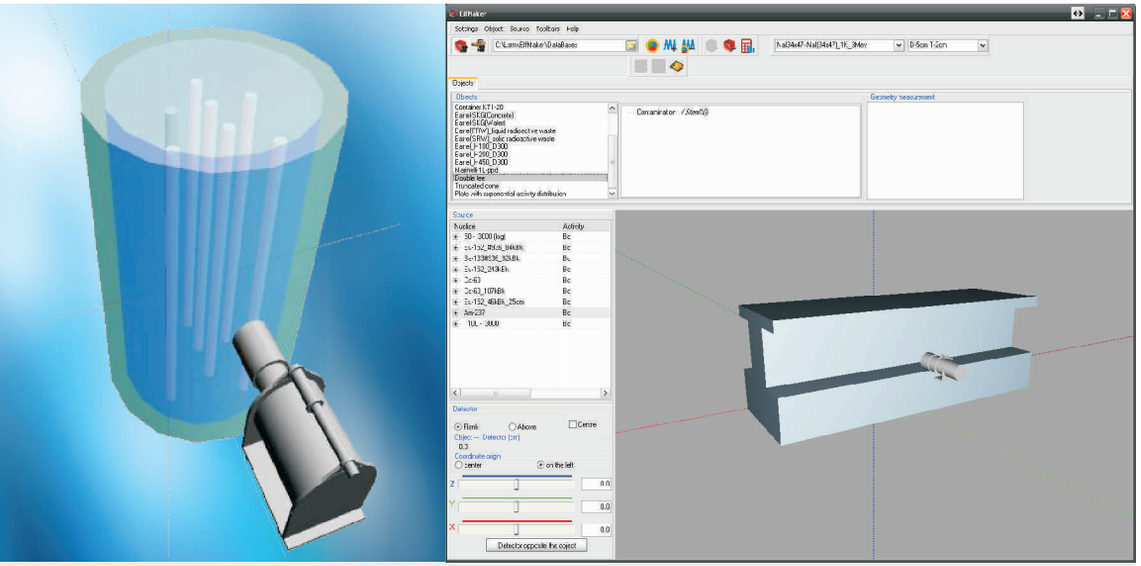
BALTIC SCIENTIFIC INSTRUMENTS



EffMaker software package

Application

Software complex EffMaker is designed for modeling of gamma-spectra and the calculation of registration efficiency for complex shaped objects that are obtained with the use of semiconducting and scintillation detectors of gamma radiation. The modeling is realized by Monte-Carlo method. For the increase of the calculations' speed for the prescribed detector there is modeled its response function that represents a set of spectra for monochromatic radiation in the prescribed range. The response function is transformed to the response matrix which takes into account number of channels of present spectrometer and its resolution. The gamma spectrum of the object (the physical spectrum of the source) in the point of the detector's location is modeled independently. The apparatus spectrum of the source is obtained as convolution of the physical spectrum with the detector's response matrix.

The main possibilities of the software EffMaker are :

- Detectors characterization to use detector parameters to calculate registration efficiency;
- Calculation registration efficiency and activities of radionuclides for objects with arbitrary geometries and composition;
- Multiple matrix correction, density, transmission correction;
- Calculation of activities of radionuclides for nonuniform distribution of activities of radionuclides in containers;
- Test beam;
- Collimator modeling tool.

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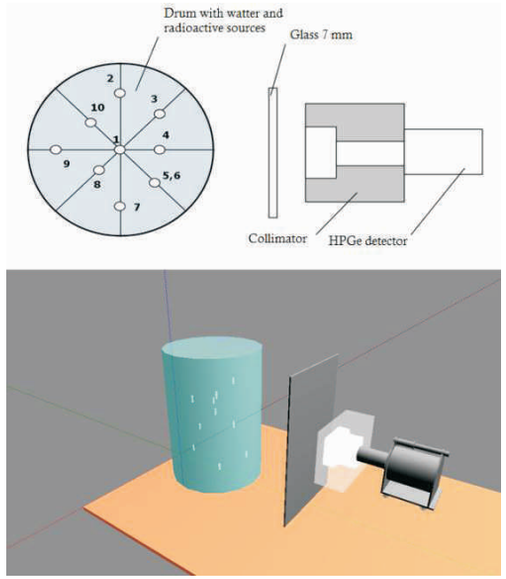
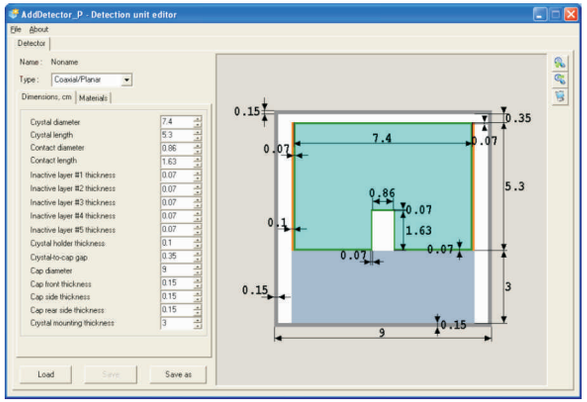
Specification

Modelling of gamma-spectra and calculation of registration efficiency for complex shaped objects

EffMaker performs mathematical efficiency calibration (without using calibration sources) of the detector for arbitrary measurement geometries, different shapes and dimensions of the source, disposal and distance from the detector, content and density of the matrix. The calculation of registration efficiency is carrying out on the base of Monte-Carlo method by the EffMaker software for containers with arbitrary geometries and composition such as (sphere, cylinder, parallelepiped etc.).



Mathematical characterization of measuring object, detector and collimator based on Monte-Carlo method by means of EffMaker program



Detector characterization window of EffMaker software

Detector characterization and for example the following templates of geometries could be provided:

- Complex parallelepiped;
- Complex cylinder;
- Pipe;
- Marinelli;
- Pipe with internal/external contamination;
- Square pipe with internal/external contamination;
- Room/parallelepiped with contaminated internal surface;
- Wall/plate;
- Other geometries according to customer needs including multilayer geometries.

EffMaker software package modules

- Module for creating and editing parameters of spectrometers – detector, analyzer, collimator
- Module for response functions calculation
- Module for response matrices of gamma spectrometers calculation
- Module for measuring objects creation and editing
- Module for energy spectra generation
- Module for physical spectra generation
- Module for apparatus spectra generation