

AbstractID: 6867 Title: An Open-source software tool to support film-based IMRT quality assurance

Purpose: IMRT QA using phantom measurements requires registration of a phantom CT scan with the original treatment plan, registration of measured dose planes to extracted plan data, and quantitative comparisons. To facilitate this, we have developed a new open-source film QA tool, the IMRT Quality Assurance Software tool (IQAS, pronounced, I-case).

Method: IQAS was built in MATLAB with the addition of 2D and 3D gamma calculations which were written in C++ and integrated with MATLAB.

Results: To perform QA, the phantom film is scanned into a Flexible Image Transport System (FITS) file format. That file is read into the film QA tool and displayed using image information stored in the file header. The film is registered to the known pin prick coordinates. The coordinates are stored in a phantom profile file and the registration is done by manually selecting points on the film. Users can select between custom optical-density-to-dose conversion profiles to compute dose in the film plane. Additional tools provide options to generate plots for dose, changing the color map, or export the film to a DICOM dose file. The integration of film with the 3D treatment plan is done via CERR (Computation Environment for Radiotherapy Research) which is open-source MATLAB based software. The user registers the 3D dose to coordinates by selecting fiducial points on the CT scan of phantom within CERR. A rigid transformation, which is purely translations and/or rotations, is applied to the 3D data. Once 3D data is transformed, tools available for evaluation include distance-to-agreement, and 2D gamma and 3D gamma functions based on new mesh algorithms for adequate speed. The results can be stored in CERR and can later be retrieved.

Conclusions: IQAS is a flexible open-source tool which provides broad functionality supporting 3D dose comparisons for film QA.