

Detection of partial defects in spent nuclear fuel assemblies with Passive Gamma Emission Tomography

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Abstract: Verification of spent nuclear fuel is a prerequisite for disposal in a geological repository. The verification method needs to be reliable and quick and allow non-destructive investigation of the fuel assemblies to ensure the integrity of the fuel prior to disposal. Recently IAEA has approved Passive Gamma Emission Tomography (PGET) to be used as a tool in rod-level examination of assemblies. In this talk, I propose a method based on simultaneous reconstruction of activity and attenuation images with sufficient prior information, formulating the reconstruction as a constrained minimization problem with a data fidelity term and regularization terms. The approach is shown to produce clear reconstructions which allow for a highly reliable classification of spent, missing, and fresh fuel rods.