

## AbstractID: 2999 Title: Air bubble- Free Motorized Flood Phantom

**Purpose:** An air bubble-free flood phantom with grid patterns is fabricated to measure extrinsic resolution and linearity of PET scanner. It is designed to implement a  $^{99m}\text{Tc}$  flood phantom with motorized water pump to reduce the shaking procedure as well as reduce radiation exposure to workers.

**Method and Materials:** The flood phantom is fabricated with circular (50cm diameter) and rectangular shapes (60cm\*40cm) to measure the extrinsic resolution of conventional gamma camera. It has a handle in which an air pocket and water pump are placed. The air pocket is made of two chambers with conical valve between them. During the shaking procedure, the air bubbles are sucked into the air pocket due to gravity effect and water perturbation. Once the air bubbles are trapped in the air pocket. They could not escape from it. After the radioisotopes are injected through a pin hole in the air pocket, water pump is turned on. The shaking procedure starts. In order to estimate the effectiveness of the shaking mechanism, the survey meter with well-guided collimator is manually rotated on the flood phantom until uniformity of 3% is reached. It take approximately 5 minutes to mix the water with radioisotopes thoroughly.

**Results:** The phantom is used to evaluate the extrinsic resolution and to estimate the uniformity/linearity of gamma camera or SPECT camera.. The images are analyzed to quantitatively measure the integral and differential uniformity and the non-linearity of the imaging system. The detailed data will be presented in the meeting.

**Conclusion:** The phantom was very handy and effective to minimize radiation exposure to an operator. The multi-channel ionization chamber will be replaced manual rotation procedure to design fully automatic monitoring system.