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Aircraft-carried sampling system for aerial radioactivity monitoring

The monitoring airborne radioactive particle became a prominent figure for early warning to form the basis of effective and successful prevention against disasters like the misfortune in Chernobyl. Air sampling and analyzing techniques are essential for early detecting nuclear activities and/or accidents of neighboring countries.

Aircraft-borne sampling system is the best way to approach the aerial point of interest. In the earlier study, we designed passive type sampling system using high speed cruise of aircraft. The design concept was focused on maximizing the suction flow necessary for achieving high efficiency of radioactive particles sampling, while minimizing disturbance to the aircraft which carries the system. The optimization was performed with the computational fluid dynamics (CFD) code, FLUENT (FLUENT Inc., 2006).

A rocket launcher of a fighter was remodeled into the sampling equipment. The sampler contained a cylindrical filter paper to collect radioactive dust and a charcoal filter to capture radioactive iodine. Replacing the samplers as the launchers at the fighter wings, the aircraft passed in the safety evaluation.

Several sampling flights have been performed to provide against emergencies and to assess environmental background. Right after the each flight, the filters were radio-analyzed in high purity germanium detectors. The long-half-life radionuclides likely to be made by nuclear experiments or accidents drew main attentions. Fortunately, no nuclide of concern was detected over minimum detectable activity.

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