Investigation of Differences of Phenomena of Diffusiophoresis and Thermophoresis from Aerosol Deposition in Modified ART Mod 2 Code

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Fission product behavior assessment in containment vessel is one of the important areas in safety assessments because the containment vessel is the final release protection. Modified ART Mod 2 code is used to study aerosol deposition phenomena in the containment vessel. From Phébus FPT experiments, there are occurrences of diffusiophoresis and thermophoresis on condensers in the containment vessel. These phenomena are recognized to be the same thing. However, this is not a universal view on these phenomena, and diffusiophoresis and thermophoresis are evaluated separately in the modified ART Mod 2 code. In previous study on the modified ART Mod 2 calculation of Phébus FPT experiments, there was more diffusiophoresis than thermophoresis in the case of single volume for containment vessel while there was more thermophoresis in the case of multiple volumes. This research aim is to conduct a sensitivity analysis of representative parameters affecting diffusiophoresis and thermophoresis namely pressure, aerosol size and temperature, under different nodalization in the modified ART Mod 2 code using Phébus FPT experiments to investigate differences. As a result, differences of temperature between atmosphere and wall in single volume affect diffusiophoresis while differences of temperature between atmosphere and wall of multiple volumes affect thermophoresis.

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