（様式5）

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<tr><td rowspan="2">指導教員<br>承認印</td><td></td></tr>
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# 学位（博士）論文要旨

(Doctoral thesis abstract)

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| 論 文 題 目<br>(Title) | 福島における放射性セシウム輸送解析と空間線量評価シミュレーション<br>Simulation study of radiocesium transport and air dose rates in Fukushima |

論文要旨（2000字程度）
(Abstract(400 words))

　The Fukushima Dai-ichi Nuclear Power Plant (FDNPP) accidents in March 2011 contaminated large parts of North-East Japan. Cesium-137 (half-life 30.1 y) is the currently main radioactive contaminant remaining within the environment. It is important to evaluate the behavior of $^{137}$Cs and air dose rates in the environment. Although lots of researchers have conducted field monitoring studies, modeling studies have been limited so far. In this doctoral thesis, the behavior of $^{137}$Cs in river catchments and air dose rates in forests were simulated and evaluated. The thesis consists of five chapters.

　Chapter 1 reviews the history of contaminant radioactive materials and research on environmental radioactivity.

　Chapter 2 summarizes the hydrogeological structure and physically-based watershed models used in this thesis. The GETFLOWS code was used to study water discharge, suspended sediment and $^{137}$Cs transport within the catchments.

　Chapter 3 reports simulation results based on three themes. First is the characteristics of $^{137}$Cs transport and discharge between five river basins near to the FDNPP after heavy rainfall events. These simulations revealed differences in $^{137}$Cs discharge ratios between the five river basins. These are explained by differences in the distribution of the initial fallout within the basins, the presence of the dam reservoirs, and the input rate of $^{137}$Cs to watercourses depending on the

land use. Second is the evaluation of sediment and $^{137}$Cs redistribution in the Oginosawa River catchment near the FDNPP. These simulations showed that $^{137}$Cs discharged to watercourses came predominantly from land adjacent to river channels and from forest gullies. Areas within forests that are far from the channels only made a miner contribution to $^{137}$Cs input to watercourses. Third is a study on the applicability of $K_d$ for modeling dissolved $^{137}$Cs concentrations in Fukushima river water. It was possible to reproduce the mean dissolved $^{137}$Cs concentrations in river water during base flow conditions using $K_d$. However neither the seasonal variability of the dissolved $^{137}$Cs concentrations in the base flow conditions, nor the peaks in concentration that occurred during storm flow conditions, could be reproduced.

Chapter 4 summarizes development of a tool for creating three dimensional models of forest compartments and land topography in order to undertake PHITS Monte Carlo simulations of air dose rates in forests. Simulations based on this method suggest that the movement of radiocesium from the canopy to the litter and soil layers in forests affects air dose rates at 1 m above the ground.

Chapter 5 summarizes the results of this doctoral thesis.

（英訳）※和文要旨の場合(400 words)