Theerapong Boonterm, Captain 2010: Analysis and Simulation of Air Flow over Complex Terrain Case Study: Air Flow over Phuka Mountain in Lop Buri. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Associate Professor Chawalit Kittichaikarn, Ph.D. 88 pages.

Phuka Mountain in Lopburi, Thailand is used as a training place for pilot students to practice taking off and landing their airplanes. However, there are many factors that affect the control of airplane during take off and landing. For example, very small pad to land, unforecast wind speed and direction, gust, turbulence and updraft and downdraft due to various mountainous areas are the main keys. This paper presents the simulation of air flow over Phuka Mountain using commercial Computational Fluid Dynamics software. Air flow over Phuka Mountain was modeled in three-dimensional domain. RNG k-ε with standard and SIMPLEC algorithm were used to solve for the separated flow. Simulation was made for flow of atmospheric air in December where the two wind directions (90 degrees and 120 degrees), three wind speeds (30, 40 and 50 m/s) and three different landing locations were studied. The results from wind tunnel experiment are used to verify with Computational Fluid Dynamics software data. From the results obtained, it is found that the velocity profile obtained from Computational Fluid Dynamics software agree well with those obtained from wind tunnel experiment. Contours of those velocity obtained from Computational Fluid Dynamics Program therefore can be used to predict the flow over the Phuka Mountain and suggest the pilot how to control the air plane during its landing and take off . From the results obtained, it can be suggested that at the location number 2, the pilots should land and make the terrain contour flying carefully at the altitude above the ground not over 84 m (275 feet) approximately. At the location number 3 and 4 which are at the top and rear side of the mountain respectively, the approach angle should be the shallow angle (approximately 5-12 degrees with the horizon) at the altitude above the ground approximately 210 m (688 feet) and far from the landing point approximately 280 m (918 feet). The aircrafts maybe slip from the glide slope because of the highly separated and swirl wind. The pilots should avoid the steep angle to approach (approximately 15-20 degrees from the vertical) which begins from 440 m (1443.6 feet) above the mountain. It cause the aircraft to be at risk for hard landing.

_____ _____ ___ / ___ / ___

Student's signature Thesis Advisor's signature