

Study On Bird Strike Prevention by Using Cries of falcon in the Birds of Prey

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Abstract: Aircraft bird strike accident is one that happens due to contact bird and aircraft that is either taking off/landing or flying in a low attitude. This bird strike accident has threatened us along with history of air transportation and it will continue be so. Thus, among many methods of preventing these bird strike accidents happening in airport runway, this research studies how to prevent accident by using cry of falcon, one of birds of prey.

Keywords: Aircraft bird strike accident , the birds of prey, falcon, prevention

1. Introduction

Aircraft bird strike accident frequently happens around airport runway. This is caused by birds loafing or feeing around are ingested into the engine or colliding with the plane body during its take off/landing or airborne at a low attitude. Among different types of bird strike accidents, one that bird is ingested into the engine, it not only causes engine shutdown but also leads to serious accidents such as physical damage or explosion and fire of engine due to rapid overheating. However, this problem can be prevented by using cry sound of falcon, a birds of prey. This research suggests utilization of falcon cry as a way to prevent bird strike accidents and it also analyzes characteristics of its sound. This study result can be used as a data for confirming possibility of using cry of various raptor birds, not only that of falcon, in a way to prevent aircraft bird strike.

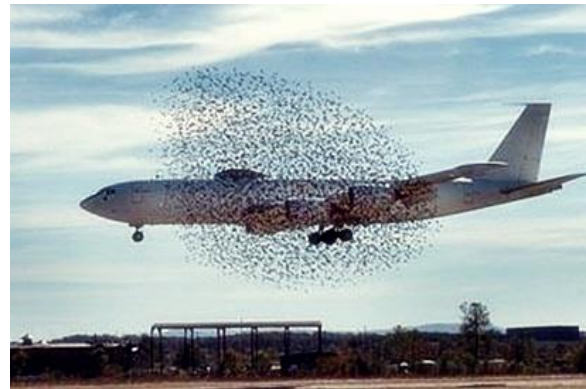


Fig1. Aircraft bird strike accident

2. Acoustic analysis of Falcon crying sound

Raptor birds are positioned on top in bird food chain. Similar to wild beasts dominate their prey by making low and strong roaring sound, raptor birds also have typical characteristics in their crying sound for dominating birds that are weaker than them. Cry sound of raptor is made to threaten opposite birds and drive them out. This research analyzed characteristics of frequency in falcon cry by using spectrum and spectrogram.

2.1. Analysis Spectrum

By looking at distribution of falcon cry sound through spectrum analysis, we could

know what composes this unique sound of raptor birds threatening other birds.

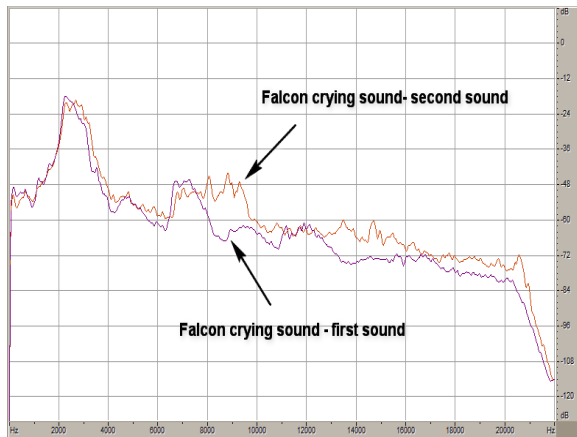


Fig 2. Spectrum of Falcon crying Sound

It was identified through spectrum analysis that raptor cry sound has a harmony that repeats twice and it is composed of leading and following sounds. Figure 2 is a spectrum graph showing simultaneous analysis of leading and following sounds of falcon cry. The spectrum characteristics of falcon cry was that both leading and following sounds had a strong peak points at the same time starting from 1,500Hz to 4,000Hz. For leading sound, it had a remarkable second peach in 6,000~8,000Hz scope and the following sound formed a broader bandwidth in 6,000Hz~10,000Hz scope. What is more, as it reaches high frequency area, following sound had a higher energy than the leading sound. Like this, falcon cry sound is concentrated with powerful and strong leading and following sounds, trying to deliver threatening message to birds which they have set as a target.

2.2. Analysis Spectrogram

Spectrogram is a sound analysis which examines sound distribution and articulation by visualizing density of frequency by time range.

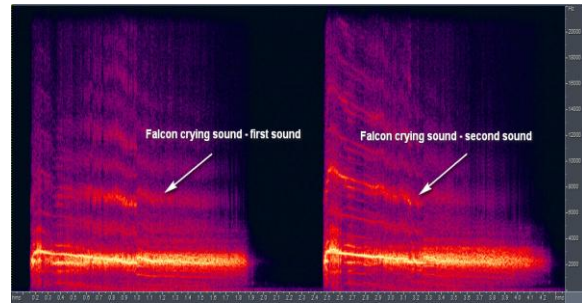


Fig. 3. Spectrum of Falcon crying Sound

Figure 3 is a graph identifying uniqueness and characteristics of sound by checking changes in amplitude in falcon cry sound. Although its leading and following sounds have many similarities but there is an important difference. In 2,000Hz range, both leading and following sounds have the typical density shown in strong sound. However, there are many differences in distribution and amplitude of those two sounds in over 4,000Hz scope. For leading sound, its figure in the first half is weaker and shallower than that of distribution in 2,000Hz but following sound tend to have three very clear but weak lines under 2,000Hz. Also, in range over 3,000Hz, it is also showing many clear and weak lines. The first half part of leading sound has parallel shape with irregular changes but that of following sound has strong high frequency which decreases gradually. This implies that falcon cry sound first threatens prey by making strong and heavy sound and later following sound is turned to strong and sharp tone to press the prey.

3. Conclusions

As airplane is operated under state-of-the-art science technology its electrical transmission system might be interfered by certain factors. Therefore, to prevent bird strike accidents, traditional method is the safest solution but cannot guarantee the perfect removal of the birds. Examples of traditional way are making a noise by playing musical instrument or empty cans or blowing whistle, also another way is to remove

their habitat by cutting off surrounding grass and trees. However, temporary and instant solutions are not so effective for feathered animals like birds. To improve this, this research suggests repelling of birds by utilizing cry sound of their enemy, birds of prey and actually analyzed cry sound of falcon. As a result, it was found out that falcon cry sound consisted of leading and following sounds. Also, leading sound was highly concentrated and sharp sound transformation in high frequency area of following sound were good enough to threaten those birds in low class of food chain. The conclusion of this research is that cry sound of falcon positioned on top of food chain is a good tool for repelling birds that loaf around the airport and may cause bird strike.

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