Weakening Fire Vortex Using Symmetry Breaking Method

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Fire vortex is a certain type of fire that curls upward like a tornado. It is also known to cause more damages and harder to extinguish compared to other types of fire, because of its characteristic of spreading embers widely. However, no preceding research mentions about weakening methods of fire vortex. This study examined the weakening methods by using a unique experiment tool. We figured out the fundamental cause and characteristics of this phenomenon to know the factors those can influence it. Then, we used fluid physics to verify and analyze those experiments and simulated the air flow of fire vortex using a thermo-graphic camera and a fog machine. As weakening fire vortex seemed to be pulling down the air flow we aimed at breaking symmetrical arrangements. Our experimental tool has square holes on the plate to fix aluminum rods in them and using these aluminum rods, we could make geometrical shapes like ellipses and many asymmetric ones. Eventually, we found out that the fire vortex is hard to form in asymmetrical arrangements of rods and height of the fire was less than 40% in average of that of a control group which kept the symmetry.This shows that symmetry breaking methods can weaken fire vortices.This research can give supportive helps of extinguishing fire vortex type incidents more effectively. However,since this research studied weakening methods in a laboratory scale further research is necessary.

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