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MODELING OF A SOLAR CHIMNEY ON ENERGYPLUS

Abstract: *A solar chimney is a way of improving the natural ventilation of buildings by using convection of air heated by passive solar energy. A simple description of a solar chimney is that of a vertical shaft utilizing solar energy to enhance the natural stack ventilation through a building. In this work a modeling of a solar chimney has been made by Energyplus software. The result is compared with previous study.*

Keywords: *solar chimney, natural ventilation, optimization*

1. INTRODUCTION

Efficient air ventilation and thermal comfort are of great importance in rural areas and hot climate conditions. Ventilation is the intentional supply of fresh outdoor air to a space to dilute and remove indoor air contaminants. Ventilation, whether naturally or mechanically, is a very urgent need in many residential and industrial zones. Natural ventilation occurs due to two causes: aeromotive or wind driving force, or buoyancy driving force (stack effect) due to temperature difference between indoor and outdoor air temperatures. A significant temperature difference should be existed for the thermal driving force or stack effect to be appreciated. Use of solar energy can create such a large temperature difference, and hence improve the stack effect for space natural ventilation.

The solar chimney is used in most tropical countries, where it is almost very difficult for the majority to have an air conditioner, people rely on natural ventilation, instead, to achieve comfort through opening windows. However, in some climates, where the wind effect is not

significant, just opening windows cannot effectively move the air inside the space to help diluting contaminants, odors, and satisfying the comfort feeling. This is due to the small pressure difference between the indoor and outdoor air. The solar chimney design and construction allow storing an amount of solar energy into a surface, then releasing this energy to an adjacent column of air raising its temperature, and accordingly it flows upward entraining an outdoor fresh air into the space. This will create an air breeze inside the space.

The main driving force in moving the air upward in the chimney is the buoyancy force due to the absorbed energy.

In this paper we will investigate a solar chimney for Belgrade Serbia and compare it to previous study to see the result of enhance of the volume flow rate.

2. PREVIOUS STUDY

The solar chimney is an attractive idea for many researchers in different fields. Some previous studies have been seen in the literature that investigates the use of

