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Mechanical Engineering

INFRARED THERMAL AND VISUAL IMAGE ANALYSIS FOR THE MODELLING OF PROPERTIES IN CASCADING PARTICLE CURTAINS

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Abstract

To be completed at later date.

Acknowledgements

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1 Introduction

Understanding temperature distributions in Engineering applications plays an invaluable role toward understanding the effectiveness of design. As the most frequently measured physical quantity, the quantification of temperate values and their distributions allows for design goals to be achieved in a far more succinct manner and plays a key role in a diverse range of engineering systems. One particularly challenging engineering process that proves problematic in obtaining thermal data for is the particle curtain.

Particle curtains are defined as a continuous stream of particles made to fall in a curtain-like shape through a gaseous medium. They are employed in a wide variety of industries as heat exchangers for particulate mediums, due primarily to their simplicity and low operational costs [Afshar, 2015, Andrew, 2008]. Examples include the flighted rotary dryer (FRD) and the hopper, which are common in mineral and pharmaceutical industries. However, particle curtains are steadily emerging in promising new renewable energy technologies for use in concentrating solar power (CSP) plants. These solar particle receiver designs are currently in the early demonstration phase, delivering improved thermal efficiency through their direct storage of heat within sand-like particles [Christian and Ho, 2015, Viebahn et al., 2011].

1.1 Objectives

2 Literature Review

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