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## NATURAL CONVECTION IN A TWO-DIMENSIONAL ENCLOSURE HEATED SYMMETRICALLY FROM BOTH SIDES

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### ABSTRACT

Experimental and numerical studies are performed for transient and steady natural convection phenomena in a two-dimensional cavity heated symmetrically from both sides with a uniform heat flux. In the experimental work, temperatures are measured with thermocouples located along the side walls and also along the centreline of the tank. Flow visualisation is performed by video recording the flow using a fluorescent dye illuminated by ultraviolet light. It is observed that this situation leads to a well-mixed layer at the top marked by multiple loops, below which the fluid is thermally stratified. The flow pattern in the cavity is found to be significantly different from the well-studied phenomena of differentially heated enclosures. Numerical modelling is also performed using a finite volume method. The measured temperatures and flow visualisation results show a good agreement with the numerically generated results. © 2002 Elsevier Science Ltd

### Introduction

Study of natural convection in enclosures has many engineering applications such as in building technology, cooling of electronic equipment, solar collectors, materials processing, manufacturing, and so on. The importance of this subject in several diverse fields of science and engineering is amply reflected by the vast amount of research effort dedicated to this topic during the past few decades [1, 2]. Depending on the geometry and orientation of the enclosure, the natural convection phenomena can be classified into two broad classes [3]: