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IDEAL SOLUTIONS OF THE TARRY-ESCOTT PROBLEM OF DEGREES FOUR AND FIVE AND RELATED DIOPHANTINE SYSTEMS

by Ajai CHOUDHRY

ABSTRACT. In this paper, we obtain parametric ideal non-symmetric solutions in integers of the Tarry-Escott problem of degrees four and five, that is, of the system of simultaneous equations $\sum_{i=1}^{k+1} a_i^r = \sum_{i=1}^{k+1} b_i^r$, $r = 1, 2, \ldots, k$ where k is 4 or 5. We use these non-symmetric solutions to obtain parametric solutions of the two diophantine systems $\sum_{i=1}^{k+1} a_i^r = \sum_{i=1}^{k+1} b_i^r$, $r = 1, 2, \ldots, k, k+2$ where k is 4 or 5.

1. INTRODUCTION

This paper is a sequel to my earlier paper [1] regarding the Tarry-Escott problem. It would be recalled that very little is known about ideal non-symmetric solutions of the Tarry-Escott problem of degree k when $k > 3$. When $k = 4$, the only known parametric ideal non-symmetric solution of the Tarry-Escott problem is given in [1]. This solution is in terms of polynomials of degree 8 in two parameters. When $k = 5$, only a single numerical solution seems to have been published [2, p. 27]. No non-symmetric solutions have been published for $k > 5$.

In this paper, we will obtain parametric ideal non-symmetric solutions of the Tarry-Escott problem of degrees four and five. The parametric solutions of the Tarry-Escott problem of degree four obtained in this paper are more general and much simpler as compared to the parametric solution of this problem given in [1].

It has already been shown in [1] how ideal non-symmetric solutions of the Tarry-Escott problem of degree k may be used to generate solutions of the system of equations