THE PROBLEM OF THE CUBIC VARIETY IN S_4*

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1. *Introduction.* One of the outstanding problems of algebraic geometry that is still unsolved is the classification of Cremona transformations in space of more than two dimensions, and another, closely related to the preceding, is that of possible series of composition.

The theorem of Noether (80), later clarified and interpreted by Segre (90), Castelnuovo (14), Chisini (17), and Alexander (1), has answered the latter problem for the plane; while a large number of papers, represented in particular by the recent work of Hudson (67), Mlodzieioski (73)–(76), and Montesano (79), have made the construction of tables a definite procedure.

The smaller problem of the involutorial transformations has been completely solved by Noether (81), Bertini (6), and others, thus furnishing a weapon of incalculable importance for the study of various applications. Periodic transformations and their groups have been studied from various points of view by Kantor (69)–(70), Wiman (112), and Coble (20)–(21).

The corresponding problem in space is still almost undeveloped. Notwithstanding the excellent report made by Coble (22), the less ambitious one by me (103), the appearance of the extensive treatise by Hudson (67), and the Report of a committee of the National Research Council (106), I wish to speak of one phase of the latter problem. For regular transformations in space of three dimensions, the important theorem of Hudson (66) and a recent memoir of Montesano (78) are distinct steps in advance. When the

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