1135-VP-1548 **Pallavi Mishra***, Department of Mathematics, IIT Kharagpur, Kharagpur, India, and **Dharmendra Kumar Gupta**, Department of Mathematics, Indian Institute of Technology, Kharagpur, Kharagpur, India. *A graph-based approach for counting all Sudoku squares of rank n.*

This paper deals with a graph-based approach for counting all Sudoku squares of rank n. First, all the S-permutations are generated and an S-permutation graph $G_s = (V_s, E_s)$ is constructed in which vertices represent S-permutations and two vertices are connected by an edge if and only if their corresponding S-permutations are not disjoint to each other. A set of mutually disjoint S-permutations corresponds to an independent set of G_s. A vertex $v \in V_s$ is selected randomly and an induced subgraph $\hat{G}_s = (\hat{V}_s, \hat{E}_s)$ of G_s is derived by considering all mutually disjoint vertices to v. There is a one to one correspondence between a maximum independent set of $\hat{G}_s$ together with v and a Sudoku square. Now, an algorithm is developed to count all the maximum independent sets of $\hat{G}_s$ which are equal to all Sudoku squares of rank n. The correctness of the algorithm is shown and its time complexity is $O(3^{\frac{\xi_n}{3}})$, where ξ_n is the total number of S-permutations mutually disjoint to an S-permutation. The algorithm is experimentally tested for Sudoku squares of rank up to 3. An upper bound on the total number of Sudoku squares is also derived. (Received September 23, 2017)