Meeting: 1007, Santa Barbara, California, CHANG, Invited Address

1007-05-118   **Mei-Chu Chang*** (`mcc@math.ucr.edu`), Mathematics Department, University of California, Riverside, CA 92521. *Set addition and set multiplication.*

Let A, B be finite subsets of a ring R. The *sum set* and the *product set* are $A + B = \{a + b \mid a \in A, b \in B\}$, and $AB = \{ab \mid a \in A, b \in B\}$. In a 1983 paper Erdős and Szemerédi conjectured that for sets of integers, either the sum set or the product set is large. More precisely, taking $A = B$ with n elements, either the sum set or the product set should have nearly n^2 elements.

This problem is still unsolved, in spite of a considerable number of recent results.

We will describe the present status of the conjecture and several related developments. For example, we will give results for sets A and B of different sizes. We will also discuss generalizations to rings that are different from $\mathbb{Z}$ or $\mathbb{C}$, including noncommutative settings. Finally we will give some applications to the theory of exponential sums. (Received February 14, 2005)