1067-05-13 **Alexander Lubotzky*** (alexlub@math.huji.ac.il), The Hebrew University of Jerusalem, Jerusalem, Israel. *Expander graphs in pure and applied mathematics, I.* Preliminary report.

This is the first of three lectures in which we will describe expander graphs, their properties and their growing role in computer science, and in pure mathematics.

Expanders are sparse graphs (i.e. graphs on n vertices, with $n \to \infty$, while the valency k is bounded) that are still "very much connected". Random walks on such graphs converge very fast to the uniform distribution. The initial interest came from the computer science community, where expanding graphs play a basic role in many communication networks, algorithms and more.

While it is easy to show that expander graphs exist (by random consideration á la Erdős) it is non trivial to give explicit constructions. Various deep mathematical tools, such as Kazhdan Property (T), Ramanujan conjecture, sum-product results have been applied to this goal, as well as a more direct combinatorial construction "the Zig-Zag product". In the first talk, we will give the basic (different) definitions, examples and constructions and illustrate some of the applications. (Received September 16, 2010)