1037-05-109 **Frantisek Kardos** and **Daniel Kral*** (kral@kam.mff.cuni.cz), ITI MFF UK, Malostranske namesti 25, Prague, and **Jozef Miskuf** and **Jean-Sebastien Sereni**. *Fullerene graphs - combinatorics meets chemistry.*

Fullerenes are carbon-cage molecules comprised of carbon atoms that are arranged on a sphere with twelve pentagon-faces and other hexagon-faces. The icosahedral C_{60}, well-known as Buckministerfullerene, was discovered by Kroto et al. [Nature 318 (1985), 162–163]. Another type of fullerenes are nanotubes, cylindrical fullerenes of diameter in the range of nanometers.

Fullerene molecules can be represented by cubic planar graphs with faces of size five and six. Since carbon atoms are 4-valent, precisely one of the three bonds at every atom is doubled. The doubled bonds form a perfect matching, known as Kekulé structure to chemists. The stability of a fullerene molecule is closely related to the number of perfect matchings in the corresponding graph.

It was conjectured that the number of perfect matchings is exponential in the number p of atoms for every fullerene molecule. The conjecture have been indicated to be true by computer search and verified for several special types of fullerene molecules. The best known general bound of $\left\lceil \frac{3(p+2)}{4} \right\rceil$ was established by Zhang et al. [J. Math. Chem. 30 (2001), 343–347]. In this talk, we present a proof that every fullerene molecule has at least $2^{\frac{p-380}{61}}$ perfect matchings. (Received January 28, 2008)