1057-62-264 **Roberto Fontana*** (roberto.fontana@polito.it), Corso Duca degli Abruzzi, 24, I-10129 Torino, Italy, and **Giovanni Pistone** (giovanni.pistone@polito.it), Corso Duca degli Abruzzi, 24, I-10129 Torino, Italy. *Algebraic generation of Orthogonal Fractional Factorial Designs.*

The joint use of counting functions, Hilbert basis and Markov basis allows to define a procedure to generate all the fractional factorial designs that satisfy a given set of constraints in terms of orthogonality (Fontana, Pistone and Rogantin (JSPI,2000), Pistone and Rogantin (JSPI, 2008)). The general case of mixed level designs, without restrictions on the number of levels of each factor (such as power of prime number) is studied. The generation problem is reduced to finding positive integer solutions of a linear system of equations (e.g. Carlini and Pistone (JSTP, 2007)). This new methodology has been experimented on some significant classes of fractional factorial designs, including mixed level orthogonal arrays and sudoku designs (Fontana and Rogantin in Algebraic and Geometric Methods in Statistics, CUP (2009)). For smaller cases the complete generating set of all the solutions can be computed. For larger cases we resort to the random generation of a sample solution. (Received January 25, 2010)