Novel Combined Mod-P Structures: A Complete Set of Multiband Antennas inspired on Fractal Geometries

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One of the main challenges in the field of multiband antennas is the difficulty to find an antenna which can operate at more than two or three frequency bands. Most of antenna engineers would like to have an antenna design which could work at, for instance, DAB, TETRA, GSM900, DCS, UMTS and BLUETOOTH™, with similar radioelectric parameters at all these frequency ranges. Therefore, an antenna which could cover all these services should have the capability of including new bands by simply modifying the antenna geometry. Also, parameters such as the spacing between bands and the input resistances of the radiator could be adjusted by modifying part of the structure. Multilevel-shaped antennas (Multilevel Antennas, Invention Patent WO0122528) become a good and efficient solution to design multiband antennas. In (J.Soler, J.Romeu, C.Puente, "Mod-p Sierpinski Fractal Multiband Antenna", AP2000 Millennium Conference on Antennas and Propagation, Davos, 9-14 April 2000) it was first shown that the classical Sierpinski antenna, which features a spacing between bands of two, is in fact a special case of a wider class of structures, which are referred as mod-p Sierpinski antennas. The latter can provide spacings between bands higher than two. Also, a new frequency band can be easily included by just adding a new fractal iteration. However, by including a new fractal iteration the spacing between bands keeps constant; that is, for instance, for the mod-3 Sierpinski antenna the spacing between resonances is three for any fractal iteration.

In order to add new resonances to the antenna and also to change the spacing between the new resonances, the geometries of different mod-p structures can be combined, Fig.1. The strategy on how to build these novel combined antenna geometries is described and the results are compared with previous reported multiband antenna solutions.

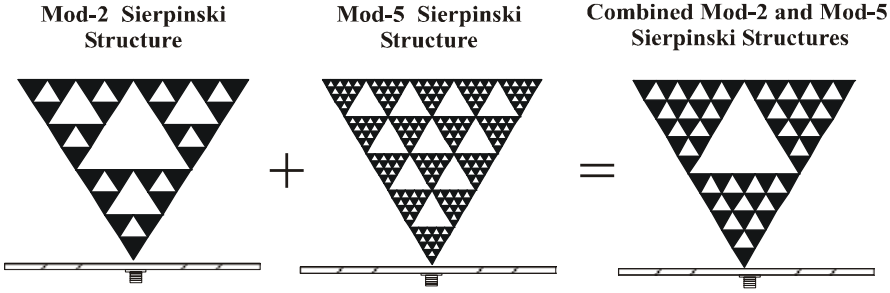

Fig 1 Concept description for the generation process of a new antenna geometry based, for instance, on the mod-2 and mod-3 Sierpinski structures to accommodate new resonances with variable spacings between bands.