

An Investigation into the Impacts of High-Frequency Electromagnetic Fields Utilized in the 5G Technology on Insects

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Abstract : This paper addresses a very topical issue today. The frequency range 2.5-100 GHz contains frequencies that have already been used or will be used in modern 5G technologies. The wavelengths used in 5G systems will be close to the body dimensions of small size biological objects, particularly insects. Because the body and body parts dimensions of insects at these frequencies are comparable with the wavelength, the high absorption of EMF energy in the body tissues can occur (body resonance) and therefore can cause harmful effects, possibly the extinction of some of them. An investigation into the impact of radio-frequency nonionizing electromagnetic field (EMF) utilized in the future 5G on insects is of great importance as a very high number of 5G network components will increase the total EMF exposure in the environment. All ecosystems of the earth are interconnected. If one component of an ecosystem is disrupted, the whole system will be affected (which could cause cascading effects). The study of these problems is an important challenge for scientists today because the existing studies are incomplete and insufficient. Consequently, the purpose of this proposed research is to investigate the possible hazardous impact of RF-EMFs (including 5G EMFs) on insects. The project will study the effects of these EMFs on various insects that have different body sizes through computer modeling at frequencies from 2.5 to 100 GHz. The selected insects are honey bee, wasp, and ladybug. For this purpose, the detailed 3D discrete models of insects are created for EM and thermal modeling through FDTD and will be evaluated whole-body Specific Absorption Rates (SAR) at selected frequencies. All these studies represent a novelty. The proposed study will promote new investigations about the bio-effects of 5G-EMFs and will contribute to the harmonization of safe exposure levels and frequencies of 5G-EMFs'.

Keywords : electromagnetic field, insect, FDTD, specific absorption rate (SAR)

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