

Near and Far field HF Antenna Parc Characterisation

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I. INTRODUCTION

HF antennas operate roughly between 3 MHz and 30 MHz and are mainly used nowadays for long to very very long distance communications by radio amateurs, by commercial and military aviation and marine and by land forces, sometimes merely as a backup system to more recent and broadband long range communication systems such as satellite radiolinks. A great variety of HF antennas are available and in use, from omnidirectional to fairly directive, from narrowband to wideband, from medium to very high power [1].

II. FAR FIELD

The 0,5 km² antenna parc of Ruiselede consists of 26 large high power antennas among the different kinds listed above and is used for military strategic communications with land, sea and air components. Due to the high concentration of antennas in the parc, the distance between their feeding networks and accesses is sometimes less than 100m, corresponding to 10λ at 30 MHz but less than λ at 2 MHz. In those conditions, it can be expected that the radiation patterns as computed and provided by the manufacturer and assembler be somewhat distorted in the actual antenna parc configuration [1][2][3]. This information might be essential to guarantee the actual coverage of directional HF antennas and assess the absence of coverage dips or nulls, but it is never measured after installation. Fortunately, with the advent of powerful 3D electromagnetic solvers running in parallel mode on reasonable cluster resources, a complete far field characterisation of the antenna parc of Ruiselede could be obtained.

III. NEAR FIELD

Moreover such 3D solvers also allow the complete near field characterisation of the same antenna parc for any operational frequencies and powers combinations, providing the answer to a more recent concern related to high power electromagnetic sources : radiation hazard to workers and permanent neighbouring residents [4].

IV. CONCLUSION

3D electromagnetic simulation softwares combined with enough computer cluster capacity are a powerful tool that allows to answer simultaneously operational and safety questions.

REFERENCES

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