# Software Package "Pear-Shape Antenna Designer"

To construct, investigate and optimize new antenna structures, conduct of a numerical experiment is preferable to the conduct of the real one. For this purpose, a software package *"Pear-Shape Antenna Designer"* was created based on the MAS algorithm. It enables the user to find optimal parameters of the antenna to be investigated. Such program packages are of special interest for engineering purposes, as they provide a simple way to change the system's parameters continuously and eventually determine the optimal ones. Also, with the help of this software it is a lot easier to monitor the physical processes taking place in the system, analyze the results and control the system by varying its parameters when necessary.

Here is shown the main parts of the software. It is created in compliance with generally accepted standards and requires minimal computer skills from the user. Deep knowledge of the mathematical apparatus and of the method used for the solution of the problem is not necessary either. The software makes possible multiple repeats of the experiment to investigate system's electromagnetic characteristics and find its optimal parameters. Consequently, one can easily formulate specific recommendations for the construction of an antenna.
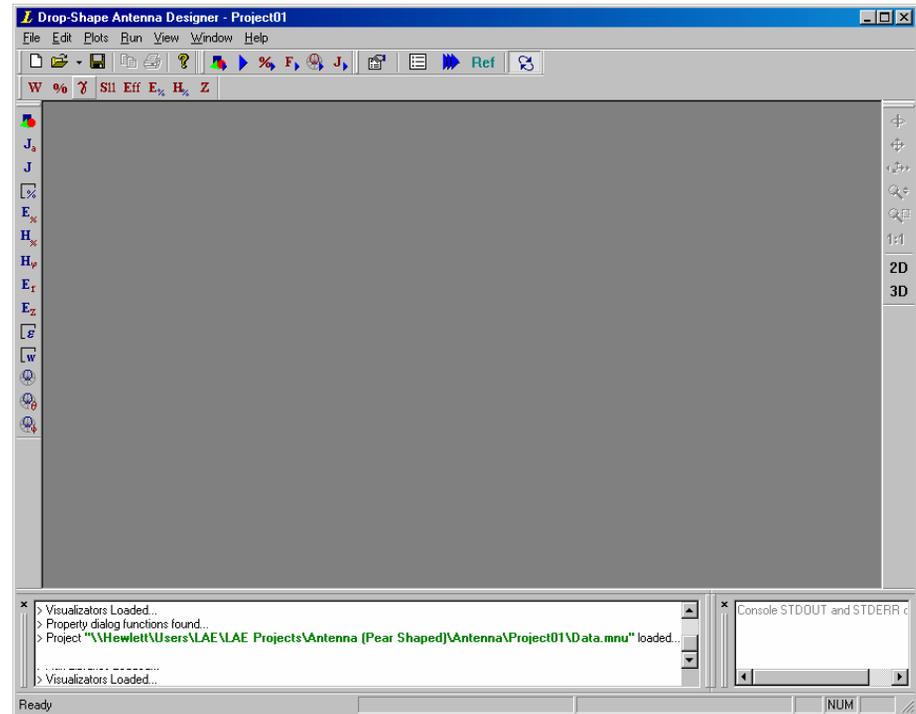
The program package operates with **Widows 95/98/NT/2000**. Its minimal requirements are: a personal computer with *Pentium II* **processor**, **64 MGb RAM**.

To process and conduct numerical calculations for each static variable, **Pentium II/300MHz** requires approximately **90** seconds. In total, the study of antenna characteristics for one particular parameter takes **1.5** hours.
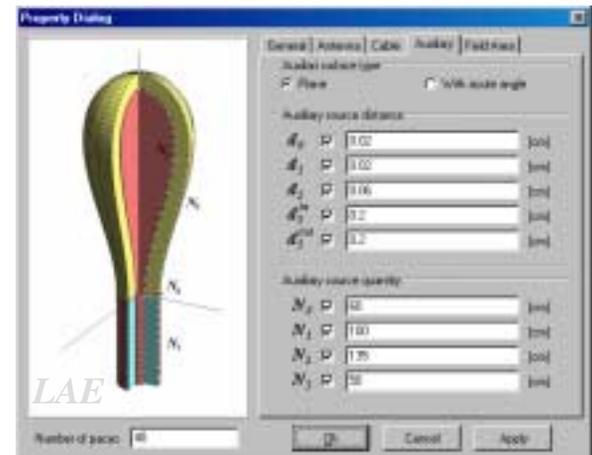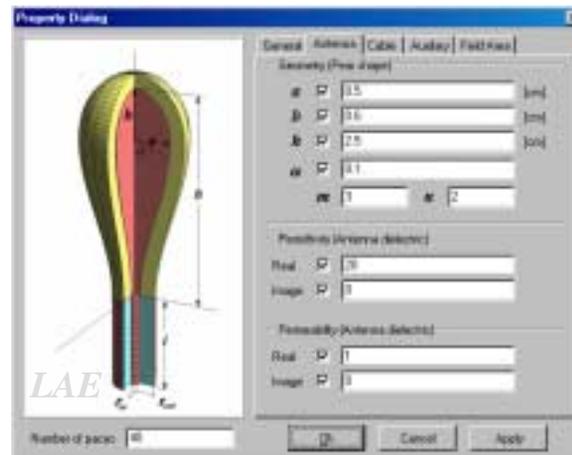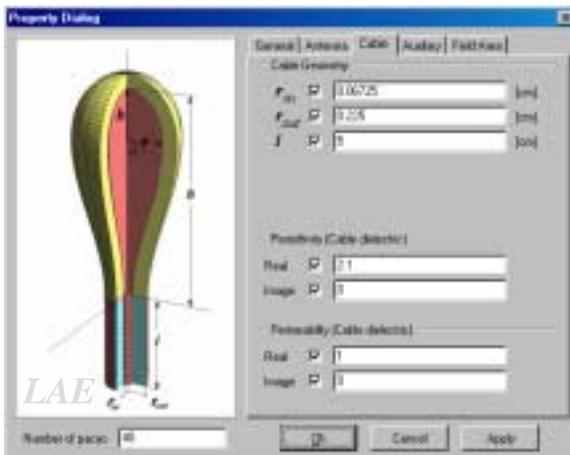
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Parameters Dialogue Boxes

The user can change the parameters of a system using a special dialogue box shown on figures. In this mode one can vary:
- the geometry of an antenna and its operating frequency;
- the size of an antenna and its dielectric characteristics;
- geometry and dielectric characteristics of the feeding cable;
- MAS parameters: location of auxiliary surfaces and auxiliary sources.

It's possible to change one or more parameters of the system in a dynamic mode to observe the behavior of radiation characteristics of an antenna with respect to the parameter varied. As a result, the user can study antenna characteristics with respect to each desirable parameter and select the optimal set of values for the parameters

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Here is shown the software package during one of the numerical experiments. It enables to observe the process, analyze obtained results and visualize them in the real time span. Under the visualization of the results are meant:
• The distribution of the far and near fields and the field diagrams in the far zone;
• Resonance graphs received by parametric calculations;
• Energy characteristics;
• Control of accuracy of the solution;
• Distribution of the currents etc.

With the help of the above described software electrodynamic properties of the antenna structure were studied to check for the electromagnetic compatibility. Also, a qualitative investigation of antenna characteristics was conducted. In order to find the best characteristics of the antenna structure, the optimal values of the set of the parameters were found. Based on this experiment, specific recommendations were formulated for the construction of a new type of antenna for wireless communications.
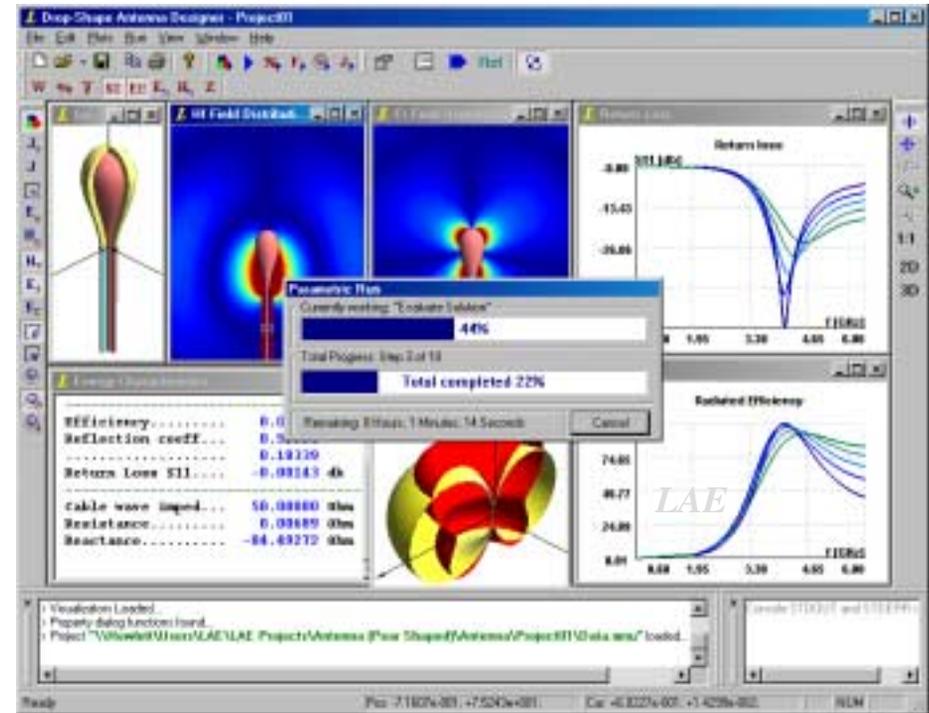
Within the framework of this software, investigation of a different type of antenna is also possible. One may also use it as a demonstration tool for educational purposes. The software enables students and novice scientists to study antenna problems individually and observe physical processes that take place in antenna structures in the real time span.