

# Manual to **virmlab**

For version 150710

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## Introduction and requirements

**virmlab** is a simulation tool for propagation environments and antennas. It is implemented in Mathwork's Matlab. Version R2009a or later of Matlab is required to use **virmlab**. Typically, a number of incoming plane waves are defined that are incident on an antenna. The far-field function of the antenna is either defined as a canonical antenna type (dipole, Huygens source, etc) or provided from simulated or measured data in an ASCII file. Antenna far-fields can be translated and rotated (and visualized in a 3D plot). Different scenarios of incoming plane waves can be defined. Diversity and MIMO algorithms can be evaluated and compared.

## Getting started

There is no graphical user interface for **virmlab**. Simulation cases are defined as Matlab scripts in the Matlab editor (for maximum flexibility to the user). Open the "example\*.m" files for several examples. (Some examples require ASCII files not provided with the software, so these will not work.)

## Variable naming

Variables are in general descriptive, but there are some exceptions; "w", "p", and "a". These variables are used so often that shorter names are motivated. "w" stands for "waves" and thus refers to incoming plane waves. It is a "struct" variable providing angle-of-arrival, strength, and polarization. "p" stands for positions. It is also a "struct" variable with x, y, z-positions and alpha, theta, phi-angles of the antenna. Finally, the variable "a" is a struct variable defining the far-field of the antenna. Together, "w", "p", and "a" defines a simulation case that can be used to calculate fading statistics.

## Contact info

This manual will be extended and improved soon. Also a lot of new features will be added. For questions contact the author for help ([carlberg.ulf@gmail.com](mailto:carlberg.ulf@gmail.com)).