Manual to **virmlab**

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# Acknowledgements

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<http://www.chalmers.se/en/departments/s2/centres/Chase/Pages/default.aspx>

<http://www.vinnova.se/sv/>

# 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

First the “main” folder must be added to Matlab’s path. This is only required once.

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 examples available in the “demo” folder. (Some examples require ASCII data files not provided with the software, so these will not work.)

All functions have been documented according with a help section, including a H1 help line, see <http://se.mathworks.com/help/matlab/matlab_prog/add-help-for-your-program.html?requestedDomain=www.mathworks.com>. Write

**lookfor far-field**

in the Matlab prompt to get a list of various functions for plotting far-fields.

# 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. Also the variable name “H” is used for the resulting channel matrix. It corresponds to the complex voltage at the antenna port.

# 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)).