



UNIVERSITY OF  
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# GEO 600 Simulation Workshop

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# GEO Simulation Group

- GEO Simulation Group has been started January 2007
- The main activities so far are concentrated around one-day [workshops](#) (this is number 5) and the [Wiki](#)
- One principle aim is to support the GEO commissioning work
- Further: provide a forum for simulation related activities of all GW based research in and around the GEO research groups
- Even further: collect and provide existing knowledge (from GEO) in this area to the community



# The GeoSim Website

- [www.sr.bham.ac.uk/dokuwiki/doku.php?id=geosim:home](http://www.sr.bham.ac.uk/dokuwiki/doku.php?id=geosim:home)
- A public Wiki with
- Hosts:
  - Meeting dates
  - Talks of past meetings
  - References to GeoSim
  - Links to simulation programmes
  - Further information
  - .....

**Tools for Finesse: Matlab/Octave Mex Files**

- The Mex files (source code): [m2kat.zip](#)
- The example files: [m2katexample.m](#), [cavity1.kat](#)

**Matlab/Octave - Finesse communication**

On a Linux or Mac OS X system Finesse can be start in 'servermode', in which an input file will be read and preprocessed as usual but instead of actually performing the simulation task (i.e. running along the xaxis) Finesse will become idle and listen to incoming TCP/IP connection via a user-defined port. A Matlab/Octave client can then send commands via TCP/IP to Finesse, for example, to set a certain parameter to a new numeric value, and it can receive output data, for example, the photodiode outputs.

The following sketch illustrates how, in the case of a simple example the communication between Finesse and Matlab/Octave would work:

**Finesse**

Finesse in server mode:  
An input file has been loaded but the 'xaxis' command is ignored - Waiting for client connection

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After receiving a input value, Finesse sets the previously set Parameter(s) to that value and computes ONE datapoint. All outputs are computed and the Values are send back to Matlab.

(The parameter value remians At it's new value).

**Matlab**

```

katconnect(host, port)

m2kat(parameterlist)

for i=0..100
  x=l*0.9
  out(i)=m2kat(x)
end
          
```

← Establishes a TCP/IP Connection  
 ← Sends parameter name(s) 'm1 phi'  
 ← Receives number of outputs (pds)  
 ← Sends numeric value for 'm1 phi'  
 ← Receives values for all outputs



## Some GEO 600 Simulations

- **OptoCad**
  - 2D CAD program that traces Gaussian beams through an optical layout
- **WaveProp**
  - FFT propagation code
- **LISO**
  - Numerical electronic circuit simulator, specialised tool for building electronic filters
- **Finesse**
  - Numerical Interferometer Simulation, uses Hermite-Gauss modes in the frequency domain



## New Activities

- LISA BBO Simulator (Jan Harms)
- Thermal effects with FFT simulations (Jerome Degallaix)
- Non-linear cavity simulator (Nico Latzka)
- Simulating mirrors as elastic deformable objects (Yanbei Chen)
- AdLIGO, Optickle (Kentaro Somiya)
- .....



end