

---

# **PFNET Matlab Documentation**

***Release 1.0***

**Tomas Tinoco De Rubira**

September 17, 2015



## CONTENTS

<b>1</b>	<b>Getting Started</b>	<b>3</b>
1.1	Dependencies . . . . .	3
1.2	Download . . . . .	3
1.3	Installation (Linux) . . . . .	3
1.4	Example . . . . .	4
<b>2</b>	<b>Visualization</b>	<b>5</b>
2.1	Overview . . . . .	5
<b>3</b>	<b>Indices and tables</b>	<b>7</b>
	<b>Python Module Index</b>	<b>9</b>
	<b>Python Module Index</b>	<b>11</b>
	<b>Index</b>	<b>13</b>



Welcome! This is the documentation for the Matlab wrapper of PFNET, last updated September 17, 2015.

### **What is PFNET?**

PFNET is a library for modeling and analyzing electric power networks. It provides data parsers, network visualization routines, and fast and customizable constraint and objective function evaluators for modeling network optimization problems.

### **License**

PFNET is released under the BSD 2-clause license.

### **Citing**

If you use PFNET in your work, please cite the software as follows:

```
@misc{pfnet,  
  author={Tomas Tinoco De Rubira},  
  title={{PFNET}: A library for modeling and analyzing electric power networks},  
  howpublished={\url{https://github.com/ttinoco/PFNET}},  
  month={July},  
  year={2015}  
}
```

### **Contact**

If you have any questions about PFNET or if you are interested in collaborating, send me an email:

- Tomas Tinoco De Rubira ([ttinoco5687@gmail.com](mailto:ttinoco5687@gmail.com)).

### **Documentation Contents**



## GETTING STARTED

This section describes how to get started with PFNET in Matlab. In particular, it covers required packages, installation, and provides a quick example showing how to use this package.

### 1.1 Dependencies

PFNET for Matlab has the following dependencies:

- **PFNET**: underlying C routines wrapped by this package (`libpfnet`).
- **Graphviz** ( $\geq 2.38$ ): graph visualization library (`libgvc`) (Optional).
- **Raw parser** ( $\geq 1.0$ ): library for parsing power flow files in PSSE raw format version 32 (`libraw_parser`) (Optional).

### 1.2 Download

The latest version of PFNET can be downloaded from <https://github.com/ttinoco/PFNET>. Right now the Matlab wrapper is on the branch `tomas-matlab`.

### 1.3 Installation (Linux)

To use PFNET from Matlab, the location of the package needs to be added to Matlab's search path. This can be done within Matlab using:

```
>>> addpath(strcat(getenv('PFNET'), '/matlab'));
```

where `$PFNET` is the root directory of the PFNET library. Then, the library needs to be loaded using:

```
>>> pfnet.load_library
```

The environment variable `$PFNET` is needed by this routine to find the required header files and shared library. The command:

```
>>> libfunctions libpfnet
```

can be used to list all the loaded functions of PFNET and hence to check whether the library was loaded successfully.

If PFNET was built with visualization capabilities, then Matlab needs to be loaded with the Graphviz shared libraries `libcgraph.so` and `libgvc.so`. This can be done by starting Matlab using the command:

```
> LD_PRELOAD=${GRAPHVIZ}/lib/libcgraph.so:${GRAPHVIZ}/lib/libgvc.so matlab
```

where `${GRAPHVIZ}` is the Graphviz installation directory, or more conveniently, by defining:

```
alias matlab='LD_PRELOAD=${GRAPHVIZ}/lib/libcgraph.so:${GRAPHVIZ}/lib/libgvc.so matlab'
```

and then starting Matlab with the redefined command `matlab`.

## 1.4 Example

As a quick example of how to use the PFNET Matlab package, consider the task of constructing a power network from a **MATPOWER**-converted power flow file and computing the average bus degree. This can be done as follows:

```
>>> addpath(strcat(getenv('PFNET'), '/matlab'));

>>> pfnet.load_library

>>> net = pfnet.Network();
>>> net.load('ieee14.mat');

>>> deg = 0;
>>> for i=1:net.num_buses
>>>     bus = net.get_bus(i-1);
>>>     deg = deg + bus.degree/net.num_buses;
>>> end
>>> disp(deg);
2.86
```



## VISUALIZATION

This section describes how to visualize power networks using PFNET. To have this capability, PFNET needs the [Graphviz](#) library.

### 2.1 Overview

To visualize a power network, a `Graph` object needs to be created. To do this, one needs to specify the power Network that is to be associated with the graph:

```
>>> addpath(strcat(getenv('PFNET'), '/matlab'));

>>> pfnet.load_library

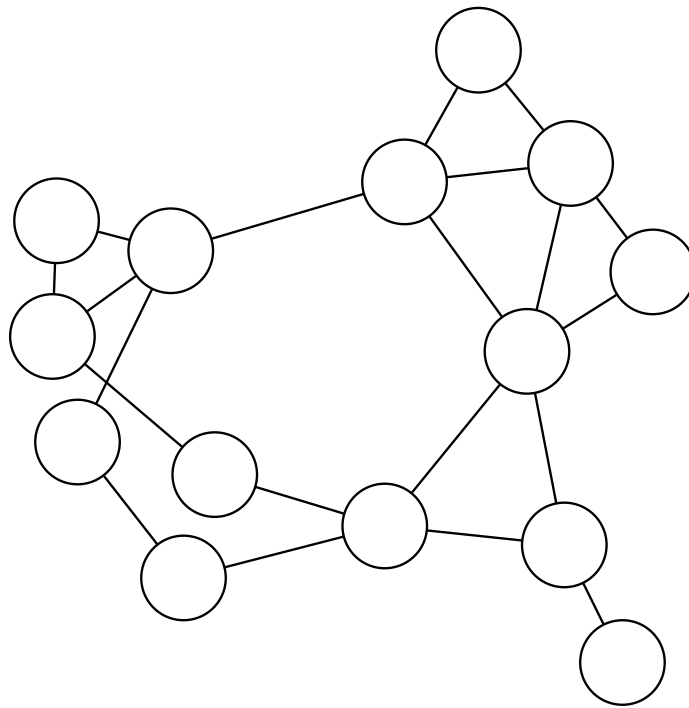
>>> net = pfnet.Network();
>>> net.load('ieee14.mat');

>>> g = pfnet.Graph(net);
```

Then, a layout must be created for the graph. This can be done using the `Graph` class method `set_layout`. This method uses the [sfdp algorithm](#) of [Graphviz](#). The graph can then be saved to a file in one of the [supported formats](#) of [Graphviz](#):

```
>>> g.set_layout()

>>> g.write('png', 'graph.png');
```



## INDICES AND TABLES

- *genindex*
- *modindex*
- *search*



**p**

pfnet, 1



**p**

pfnet, 1





## P

pfnet (module), 1