**Help Links**

This document summarizes all the OpenDSS available resources, divided by sections. Keep in mind that some of these resources are constantly being updated.

1. General:

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| **Name** | **Description** | **Links** |
| Introduction to OpenDSS | Presents some of the software capabilities, how it has been used, brief history and main objectives | [Introduction to the OpenDSS.pdf](Introduction%20to%20the%20OpenDSS.pdf) |
| Getting Started | General instructions about the program`s main files, how to register the COM server, how to access the source code and easily update it | [Getting Started With OpenDSS.pdf](Getting%20Started%20With%20OpenDSS.pdf) |
| Primer | Extremely useful to new users. Presents a general explanation of how the elements are organized in the software, the GUI and the COM interface, with some full examples. Available in different languages | <OpenDSSPrimer.pdf>  <OpenDSSPrimer_Portuguese.pdf>  <OpenDSSPrimer_SimplifiedChinese.pdf>  <OpenDSSPrimer_TranditionalChinese.pdf> |
| Manual | OpenDSS most extensive documentation | <OpenDSSManual.pdf> |
| Cheatsheet | List of commonly used OpenDSS Commands | [OpenDSS Cheatsheet.pdf](OpenDSS%20Cheatsheet.pdf) |
| Forum | Online Discussion, open to the user community | <https://sourceforge.net/p/electricdss/discussion/861976/> |
| Best of Forum | Selection of the best discussions in the Forum. Split in two documents. | <BestOf-1.pdf>  <BestOf-2.pdf> |

1. COM Interface and DirectDLL:

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| **Name** | **Description** | **Links** |
| COM Doc | OpenDSS Type Library Documentation. It presents all the methods and properties available through the COM Interface, including their types and a short description | <OpenDSSComDoc.pdf> |
| COM Speed Comparison | Explanations about simulation speed achieved when using COM interface. How to speed it up by using Early Bindings and Direct Connection Shared Library | [COM Speed Comparison.pdf](COM%20Speed%20Comparison.pdf) |
| Direct DLL | Extensive documentation about the Direct Connection Shared Library for OpenDSS | <OpenDSS_Direct_DLL.pdf> |
| Bus Interface | Presents the properties and methods available through the Bus Interface, including its type, a brief description and example written in VBA | [OpenDSS Bus Interface.pdf](OpenDSS%20Bus%20Interface.pdf) |
| Circuit Interface | Presents the properties and methods available through the Circuit Interface, including their type and a brief description | [OpenDSS Circuit Interface.pdf](OpenDSS%20Circuit%20%20Interface.pdf) |
| CtrlQueue Interface | Presents an explanation about how OpenDSS manages control elements and how the user can interact with its control process by using the CtrlQueue Interface. Mandatory reading for user who want to implement their custom control elements. Matlab and VBA code examples included | [OpenDSS CtrlQueue Interface.pdf](OpenDSS%20CtrlQueue%20%20Interface.pdf) |
| Solution Interface | Presents the properties and methods available through the Solution Interface, including their type, description and some examples | [OpenDSS Solution Technique.pdf](OpenDSS%20Solution%20Technique.pdf) |
| Property Visualization | Instructions about how to visualize the OpenDSS list of properties and methods available through COM interface in the programming environment of Matlab, VBA and Python | <Technote_COM_PropertyListVisualization.pdf> |

1. Modelling:

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| **Name** | **Description** | **Links** |
| Modelling Transformer Core Effects in OpenDSS | Explanation about when Core effects in transformer should be relevant, comments regarding the use of symmetrical components, phantom windings and other modelling hints. Includes examples | [Modeling Transformer Core Effects in OpenDSS.pdf](Modeling%20Transformer%20Core%20Effects%20in%20OpenDSS.pdf) |
| 3-Phase Transformer Core Modelling | Supplement to “Modelling Transformer Core Effects in OpenDSS”. Discuss how to model transformers with different core designs. Includes an example of a 5-Legged Core Model | [3-phase Transformer Core Modeling.pdf](3-phase%20Transformer%20Core%20Modeling.pdf) |
| Harmonics Load Modelling | Presents the load modelling in harmonics analysis. Includes a comparison between different load model assumptions | [Harmonics Load Modeling.pdf](Harmonics%20Load%20Modeling.pdf) |
| Multi-Winding Transformers | Discussion about traditional ways of modelling multi-winding transformers and reasons why OpenDSS doesn`t use them, followed by the explanation about how the transformer models are developed in OpenDSS | [Modeling Multi-Winding Transformers.pdf](Modeling%20Multi-Winding%20Transformers.pdf) |
| Regulators as Autotransformers | Complete description about how to model single-phase regulators as autotransformers. Examples included | [Modeling Regulators as Autotransformers.pdf](Modeling%20Regulators%20as%20Autotransformers.pdf) |
| Single-Phase Transformers | How to model single-phase, center-tapped distribution transformers. Example included | [Modeling Single-Phase Transformers.pdf](Modeling%20Single-Phase%20Transformers.pdf) |
| Open WYE – Open Delta  Connection | Comments about its usage, drawbacks and how it is accomplished in the software | [Modeling the OY-OD Connection..pdf](Modeling%20the%20OY-OD%20Connection..pdf) |
| PV System Element | Complete description of the PV System model in the software. Example included | [OpenDSS PVSystem Model.pdf](OpenDSS%20PVSystem%20Model.pdf) |
| Storage Element and Storage Controller | Complete description of the Storage model and the StorageController. Examples included | [OpenDSS STORAGE Element.pdf](OpenDSS%20STORAGE%20Element.pdf) |
| UPFC Element | UPFC model description, derivation and simulation results | <UPFC_Model_OpenDSS.pdf> |
| XY Curve Object | Different ways of defining the general object XY Curve | [OpenDSS XYCurve Object.pdf](OpenDSS%20XYCurve%20Object.pdf) |
| XfrmCode\_ LineSpacing | How to use the XfmrCode and LineSpacing to define similar transformers and lines, respectively. Examples included | <XfmrCode_LineSpacing.pdf> |
| Cable Modelling | Explains how Tape Shielded Cables, Concentric Neutral Cables and Line Elements can be modeled in OpenDSS. Includes examples and some questions posted in the Forum about this topic | [TechNote CableModelling.pdf](TechNote%20CableModelling.pdf) |
| Neutral Rules | Explains how the use of the properties Rneut and Xneut in Loads and Transformer elements | [OpenDSS Neutral Rules.pdf](OpenDSS%20Neutral%20Rules.pdf) |
| Loadshapes Usage | Explains different ways of importing loadshape data to OpenDSS. Especially useful when dealing with large amounts of data. | [OpenDSS LOADSHAPE Usage.pdf](OpenDSS%20LOADSHAPE%20Usage.pdf) |

1. Algorithms:

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| **Name** | **Description** | **Links** |
| State Estimation | Overview of the State Estimation problem, how it is affected by the system design and load models and how OpenDSS can be used for state estimation. It also contains the description of the Load Allocation default method in OpenDSS | [OpenDSS and State Estimation.pdf](OpenDSS%20and%20State%20Estimation.pdf) |
| Load Allocation Algorithm | Complete explanation of the load allocation and state estimation algorithms implemented in the program. Examples included | [OpenDSS Load Allocation Algorithm.pdf](OpenDSS%20Load%20Allocation%20Algorithm.pdf) |
| Dynamics Mode | Explain how the dynamics mode solution works. Examples included | [OpenDSS Dynamics Mode.pdf](OpenDSS%20Dynamics%20Mode.pdf) |
| FaultStudy Mode | Explain how the short-circuit analysis is performed in the program, including the difference between fault simulations and Fault Study Mode. It also includes a description of the Monte Carlos Fault Study and the COM interface commands related to short circuit analysis. Examples included | [OpenDSS FaultStudy Mode.pdf](OpenDSS%20FaultStudy%20Mode.pdf) |

1. Controls:

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| **Name** | **Description** | **Links** |
| Smart Inverter Modelling | EPRI`s report that describes the implementation of smart inverter, grid-support functions in OpenDSS like Volt-Var, Volt-Watt, Dynamic Reactive Current and more | <OpenDSSSmartInverterModeling-EPRI-000000003002002271.pdf> |
| Recloser, Relay and Fuse | List of parameters available for the control elements Recloser, Relay and Fuse and their respective description | <Recloser-Relay-Fuse-Documentation.pdf> |
| SwitchControl Modification | Description of recently implemented parameters for the SwitchControl element | [SwtControl Modifications.pdf](SwtControl%20Modifications.pdf) |

1. Custom Scripting:

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| **Name** | **Description** | **Links** |
| Cap Control DLL | Description of the CapController element in OpenDSS and how to customize it by using a custom control algorithm programmed through a user-written DLL | [OpenDSS CapControl DLL.pdf](OpenDSS%20CapControl%20DLL.pdf) |
| Generator User DLL | How to implement a user-written DLL for the Generator model. It includes some comments with respect to Public Data Structure and a list of definitions of all public data variables available. | [OpenDSS Generator User DLL.pdf](OpenDSS%20Generator%20User%20DLL.pdf) |
| Storage Dynamics DLL | How to implement a user-written DLL for the Storage element in the Dynamics mode. It includes some comments with respect to Public Data Structure and a list of definitions of all public data variables available. An example of implementation is given. | [OpenDSS Storage Dynamics DLL.pdf](OpenDSS%20Storage%20Dynamics%20DLL.pdf) |
| Callback Routines | Contains a listing of the DSSCallbackStructDef.Pas file, which is a structure of Function/Procedure pointers used to support the various user-written DLLs | [OpenDSS CallBack Routines.pdf](OpenDSS%20CallBack%20Routines.pdf) |
| Custom Scripting | Describes ways of performing custom scripting and how to do simple scripting of discrete-event sequential-time simulation by using the standalone version of the program. | [OpenDSS Custom Scripting.pdf](OpenDSS%20Custom%20Scripting.pdf) |
| Power Conversion Elements Essentials | Contains essential information about PC elements, including its main procedures in Delphi. | <PCElementEssentials.pdf> |
| Time-Based Simulations in Matlab | This document is provided to give the reader a basic understating for how to drive the OpenDSS using Matlab for custom calculations and control. Code examples included | [OpenDSS Time-based Simulations in Matlab.pdf](OpenDSS%20Time-based%20Simulations%20in%20Matlab.pdf) |
| Python-to-OpenDSS Control Interface | Presents the detailed OpenDSS simulation process and how the user can iteract with it in order to perform custom control algorithms. Examples included in Python | [Python-to-OpenDSS Control Interface.pdf](Python-to-OpenDSS%20Control%20Interface.pdf) |
| Python End-Of-TimeStep Cleanup For Control | New methods included in the COM interface Solution class. Gives the user more flexibility when implementing custom algorithms | <Python-End-of-timestep-Cleanup-for-control.pdf> |
| Using the Timers in OpenDSS | Describes the timer functionality added in order to record the simulation time required for different segments of the simulation process. Examples included | [Using the Timers in OpenDSS.pdf](Using%20the%20Timers%20in%20OpenDSS.pdf) |