SES

CDEGS

SES Software

New Features & Enhancements

Version 19.0   **2024**

Introduction

SES Software version 19.0 delivers new functionalities and features that expand its technical capabilities and improve user experience and efficiency.

The software has a better integrated environment with a smoother and more efficient workflow. For example:

- Every step of an AC interference study in Right-of-Way, from the data specification to the execution of runs to the plotting of results, can now be fully run from the interactive and graphical ROWCAD interface.
- SESCircuitSimulator, the dedicated interface for circuit-based modelling, can now edit and run FCDIST cases.
- SESLibrary has expanded its existing databases and added new ones including electrical resistivities and permittivities, electric strengths, and native potentials for diverse materials. New complex structures can be imported from SESLibrary into SESCAD, and native potentials of various materials can be exported to CorrCAD and SESCPCalculator.
- The handling of concentric cables in HIFREQ has been greatly improved in SESSystemViewer and SESTransient.
- SESPlotViewer is now outfitted with data processing tools reducing the need for external applications, and the new 2D-distance plot makes it particularly convenient to work with exported data sets from SESResultsViewer.
- SESTrainSimulator can create envelope plots of more quantities and with more developed filtering options. Train motion data are now accessible in the user interface.

Version 19.0 also delivers considerable improvements in terms of efficiency. You will notice a substantial acceleration of computations in both MALZ and HIFREQ. The three DC corrosion programs, CorrCAD, SESCurvefitDigitizer and SESCPCalculator, have been upgraded to a 64-bit platform allowing larger cases to be processed faster while eliminating old memory limitations. SESTransient now boasts a frequency-dependent conductor and plate subdivision algorithm, reducing computation time while fully maintaining high accuracy. In a continuing effort to maximize the usage of available resources, the Monitor Fault and Total Interference computations in ROWCAD can run in parallel on all available core processors, regardless of the license type.

Version 19.0 includes beta versions of the new SESCAD and SESBatch, which will soon become the new central conductor system editing and batch processing environments.

A key feature has been introduced to prevent data loss during file editing or in the case of an application crash. All SES applications now include an automated backup process that you can tune from the CDEGS interface (in the Options tab, under Settings).

A Backup folder is created at the same level as the case being edited to store the backup files. You can choose to back up after a given number of actions or an amount of time. You can also choose the number of backups stored. Recovery files are created in the event of an application crash. You can also enable what is called a session backup: when a project is opened and edited, a backup of the version prior to editing is stored.

New Applications

Version 19.0 of SES Software includes the following new applications:

New BETA Applications

Application	Description
SESCAD (beta)	This eventual successor to the current version of SESCAD features a 3D engine enabling components of complex systems to be displayed in greater detail, as well as an updated interface that, while significantly modernized, will remain familiar to users of the current version.

New Integrated Applications

Application	Description
FCDIST in SESCircuitSimulator	FCDIST is integrated into SESCircuitSimulator, a WPF application, resulting in a unified visual environment for fault current distribution analysis. In the new version of SESCircuitSimulator, users can create an FCDIST project or load an existing FCDIST input file (FC_*.F05) as a project, examine and edit the input data, perform the computations, and finally view the results.

Enhancements

Main Software Packages (Programs)

Improvements made:

Package	What's New
CorrCAD	- In the "Polyline Operation Tool", the polyline shift operation algorithms have been considerably improved for better performance. - In the 3D-plot, the conductor information (including its properties and computation results of the plotted quantity) is fully available and displayed when hovering the mouse over the conductor. - It is possible to view/hide all polylines in the 3D viewer. - The program supports 64-bits. - Now it is possible to access and import extensive Electrical (Native) Potential data through SESLibrary. - The program can automatically create recovery files whenever a crash occurs to prevent data loss. 'Discrete' Holiday polarization for 'Working Potential' iteration methods has been improved to achieve better accuracy. - The function 'Import Polyline' checks large coordinates and provides the appropriate message. - Now, loading and closing a large project is much faster. Furthermore, 'View Polarization Results' only loads the results without automatically making a default plot. - The active scenario working folder can be accessed from UI.
ROWCAD (Right-of-Way)	- Access to the Monitor Fault parameter definition sub-screen was made more intuitive. - SPLITS circuit computations can now be launched directly from ROWCAD. - The 'Total Interference' module has been integrated; the specification and running of the process can now be done from within ROWCAD. - Monitor Fault capabilities have been enhanced with the GPD (Ground-Potential-Difference) Analysis feature. - The Monitor Fault and Total Interference modules integrated in ROWCAD now allow creating the models for each fault location, and optionally running them immediately, either sequentially as before or in parallel on all available CPU cores. - ROWCAD now supports x64-bit architecture for enhanced performance and compatibility with modern operating systems.

Package	What's New
	• The status bar includes a hyperlink not just to the project directory, but also to the currently active scenario folder. • Advanced file overwrite operation checks have been implemented for Monitor Fault and Total Interference processes, which include the verification of existing files, their read-only status, and their current usage by other processes. • The Modify Circuit module and its most frequently used operations have been integrated into ROWCAD and restructured to no longer necessitate operating on a per terminal basis. • The 'Plots and Reports' module of Right-of-Way is now accessible directly from ROWCAD's ribbon. • The Modify Circuit Phase Removal operation has been replaced by a Phase Alteration operation, which allows changing the status of a phase to inexistent (Dummy) or to zero-impedance line with no mutual coupling to other lines. • A Summary tab has been added to the Computation Trace panel to better inform on the computing success or failure status of each run. • The classical Right-of-Way interface is now accessible via ROWCAD's Tools ribbon. • An Import button under the Monitor Fault and Total Interference screens allows transferring data previously specified in Right-of-Way's classical interface. • The data specified in ROWCAD's new modules (Modify Circuit, Monitor Fault and Total Interference) are automatically transferred to the classical ROW files when launching a ROW process through the ROWCAD interface, taking priority over pre-existing data. • ROWCAD has been renamed as 'ROWCAD (Right-of-Way)' and relocated to the root of the SES Software distribution folder.
Right-of-Way	• When using a multi-region soil in the Total Interference module, the Nearest Conductor algorithm is used for the calculation of Touch Voltages. • The 'Total Interference' module now supports MALZ templates that use a multi-region soil. • The program limits for the number of Phases, Regions, etc. are now automatically adjusted based on the content of the model generated by ROWCAD. • Modify Circuit mutual data uses scientific format.
SESAutoGroundDesign	• A scroll-bar has been added for the issue list window with long messages.

Package	What's New
	• The safety limits are updated based on the simulated soil model in the computation process.
SESShield-2D	• The limitation on the number of equipment check points has been effectively removed. The interface now allows up to 99 equipment check points inside and/or outside the station shielding system.
SESShield-3D	• The button to close the SESShield-3D report tab has been placed at a more accessible and convenient location. • The Save As file type filter of SESShield-3D is now more accurate for SD files. • The report tab can be closed using the Ctrl + W shortcut keys. • The Create folder button has been added to the SESShield-3D Construction Tree. • A container (a folder in the construction tree) now allows a single component to reside inside it, allowing for more design organization flexibility.

Computation Modules

Improvements made:

Computation Module	What's New
AutoDesign	• The full functionality of SESThreshold, for safety threshold calculations in the AutoDesign computation module, has been introduced.
HIFREQ	• Substantial improvements have been made in the time needed to calculate the current distribution in a HIFREQ conductor network that includes many elements. A reduction of the computation time by a factor of ten or more can be achieved in some cases.
MALT	• The 'Current Recovery' feature of MALT and MALZ is now functional in the presence of soil volumes.
MALZ	• The computation time is significantly reduced for cases including many conductor segments and/or finite volume patches. • The 'Current Recovery' feature of MALT and MALZ is now functional in the presence of Finite Volumes of soil. • The MALZ module now supports 'Virtual Connections'. These work the same way as in the HIFREQ module.
SESCombiner	• The module now computes the RMS value of the X, Y, and Z components of vector fields independently.

Applications

Auto-Backup and Auto-Recovery features have been incorporated into most applications, offering enhanced workflow management.

Improvements made:

Application	What's New
GRSPLITS-3D	• One can show or hide multiple sections or busses at the same time by checking/unchecking a single box.
SESBatch (beta)	• Runs can be added to SESBatch even though computations are already ongoing. • Drag & drop can be used for folders.
SESCAD	• A high-level description of continuous paths of conductors has been introduced in SESCAD. • Support for Parallel multi-region soil has been added to MALZ.
SESCPCalculator	• The application now links to SESLibrary for Native Potential, making it easy to import Native Potential data directly from SESLibrary for streamlined integration and analysis. • The application has been upgraded to a 64-bit platform, allowing larger cases to process faster and eliminate old memory limitation.
SESCircuitSimulator	• Default names (Bus 1, Bus 2, ..., etc.) are assigned to new busses. • Default names (Terminal 1, Terminal 2, ..., etc.) are assigned to new terminals. • The naming of the 3D plot types in the Examine session is enhanced.
SESConverter	• The application can now convert SES Plates to DXF entities 'Line' or '3Dface' for MALT and HIFREQ. • The SES Data plug-in has been introduced. It facilitates transferring non-geometric SES data, such as conductor characteristics and soil model information from SES input files (F05) to CAD files (DXF, DWG) and vice versa.
SESCrossSection	• New Interfaces (Beta) accessed through the new toggle button have been added to enable users to specify Cables and Pipe Enclosures. • Indicators of the polyline center and the polyline coordinate system have been added to the Cross-Section Display panel for the CorrCAD MALZ Mode and Right-of-Way mode.
SESCurvefitDigitizer	• The program supports managing the original image file location and image file name with Absolute path and Relative path.

Application	What's New
SESFFT	• A new lightning surge option using a Heidler waveform, following the specifications of the IEC-62305-1 standard, has been added.
SESFcdist	• Fault Current components in Cartesian format are changed from "Active/Reactive" to "Real/Imaginary" now.
SESLibrary	• A new database category containing Material Permittivity has been introduced. • If the application is open and a conductor is imported into it from other SES tools such as SESeBundle, SESImpedance, etc., the newly added Refresh button can be used to update the database without having to relaunch SESLibrary. • It is possible to export Native Potential of a material to CorrCAD and SESCPCalculator. • Steel Fibre-Reinforced Concrete (SFRC) has been added to the Resistivity database.
SESPlotViewer	• Synchronizing multiple axes together is now possible. • Users can now mirror data series either horizontally or vertically if the data arrives in the reverse order of how it should be presented. • Data series can now be offset, shifted either horizontally or vertically, when your data arrives misaligned and requires adjustment to align with specific milestones, such as those in a pipeline's mileposts. • A new type of plot, called 2D-Distance plot, allows specifying the value of a quantity as a function of X and Y coordinates, and automatically computes the cumulative distance along the data series, which is used as the horizontal axis of the plot. • It is now possible to lock the aspect ratio of the background image in the coordinates system of the plot. • To enhance the clarity of multi-series plots inspection, the border of the Tracker (to display the related series name and the coordinates of a target data point) now adopts the color of the currently selected data point Marker or of its Line attribute (if the Marker Type is set to None). • The application now has distinct Select and Examine, and Edit Points modes, to help avoid accidental graphical modification of the data. • Data series can now be scaled (e.g., to convert to another system of units or to simulate the effect of a current division factor). • A sorting widget is added to the numerical column headers of the series data grid.

Application	What's New
SESResap	• Both metric and imperial units are now supported in the Excel datasheet, with corresponding recommended spacings. The system of units can be selected through a drop-down menu in the Excel file. • Items in the plot legend now appear following the order of the measurement traverse tabs. • Columns in the Excel datasheet have been unmerged to facilitate pasting of data. • Both the new and the previous versions of the Excel datasheet can be imported into SESResap. The new version supports importing from multiple worksheets in the Excel file. • Links to the PDF versions of the datasheet for both metric and imperial units have been added to Help | Datasheet.
SESSystemViewer	• The control over selection of cables and cable-related data to be displayed in SESSystemViewer has been improved.
SESThreshold	• A Safety Table Scenarios tool, like that in the legacy Output Toolbox, is now available in Threshold Editor.
SESTrainSimulator	• The train data has been included in the UI. • It is now possible to produce RMS, average, maximum and minimum envelope plots for all conductor-related quantities such as GPR, current, touch voltages and many more. • All systems of units are supported. • Ability to store local copy of kml or kmz used per scenario. • Rail conductors created with the Create Rail Template button now belong to an 'element path' object, which maintains the sequential ordering of the conductor segments. • Conductor mapping for track parameters (e.g., the catenary conductor type) is now aware of the conductor types present in the template file and is done through a dropdown menu instead of entering an index.
SESTralin	• A DC voltage column is added in the Energization & Fields panel to achieve AC+DC energizations in the Circuit mode.
SESTransient	• A new lightning type signal based on the 62305 IEC standard has been added. • The Quantity Selection dropdown menu is now ordered by computation type, making it clearer. • Soil Model Data includes multi-region soil definition and remains consistent with the content of the HIFREQ template as defined in SESCAD.

Application	What's New
	• Cable support is improved in SESTransient. Any cable component can now be selected individually through the Filter/Cable Data feature. • Results are no longer loaded when opening a project, accelerating the opening runtime, which is especially beneficial to bigger projects. • The adaptive subdivision feature automatically selects the best conductor subdivision length based on several factors such as the distance from the transient input signal and the propagation medium.
SoilModelEditor	• A simplified version with default settings has been introduced for the specification of parallel boundaries in the multi-region soil in MALZ.
TransformerDataEditor	• A new three-phase transformer type with Delta - Star connection has been introduced. • The NC (not connected) status has been added to the Tertiary winding terminals.

Documentation

Version 19.0 introduces the latest additions, numerous updates and newly translated documents. The key highlights are outlined below.

Media	What's New
Interfaces	• SESKeyManager and GRSPLITS-3D are available in Portuguese. • SESLicenseManager is available in all languages supported by SES Software. • New splash screens are available for SESLibrary, SESThreshold, and SESCircuitSimulator. • Various icons have been created and updated to improve the use of SESCAD, SESBatch, SESPlotViewer, SESLibrary, SESCircuitSimulator, etc.
Online Helps	• A new updated version is available for AutoGroundDesign reflecting its new interface. For the first time, this document is available in Portuguese and Spanish. • SESImpedance is available in all languages supported by SES Software. • SESBatch (WPF version) has its first online help since the legacy version. • Context-sensitive help is available in Portuguese for most applications. • Content related to FCDIST has been added to the SESCircuitSimulator Online Help, which is available in all languages supported by SES Software. • TransformerDataEditor had its Define Transformer topic updated.
Support Documents	• The installation document for Standalone Licenses, previously known as PersonalInstall, has been revamped.

Media	What's New
	• The installation document for Network Licenses has been revamped.
Technical Documents	• How-to manuals on grounding grid analysis, Ground.pdf and AutogridPro.pdf, are now available in Portuguese. • The new Mini How-to Manual on Using Soil Volumes has been released. • The How-to manual for SESShield-3D in Portuguese has been delivered. • The Quick Start Guides ROWCAD and Right-of-Way have been merged and updated into the new document titled 'ROWCAD (Right-of-Way) User's Guide.'
Video Tutorials	• The video tutorials, 'MultiGroundZ - Safety Analysis' and 'CDEGS - Auto-Backup & Recovery,' which apply to most applications, have been created. Additionally, the video tutorial for SESTransient has been updated with new features.