Obphasor

Object Oriented Program for Electrical Engineering

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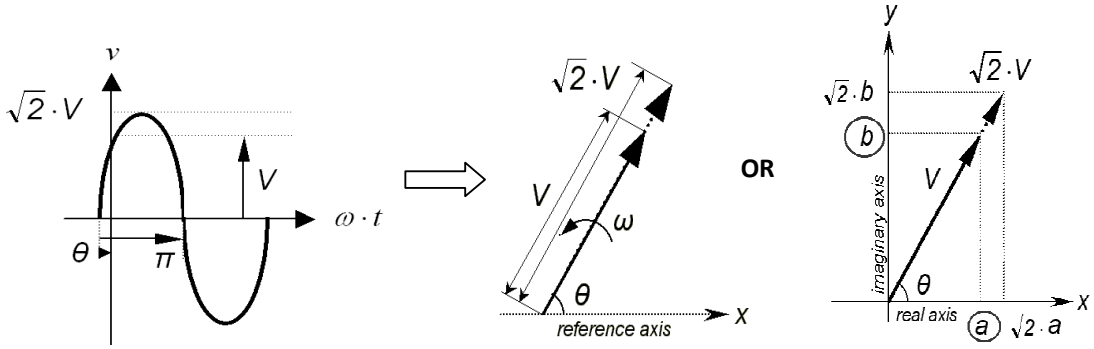
Free Software | For more details and download, visit:
http://www.smartgrids.ro/obenerg/obphasor

The existing programming environments assure *not only the computerization, but also the reconsideration of the onset mode of some calculus types. The identification of physical objects as mathematical objects, which express their properties in an abstract form, has become a natural trend*. Besides the data types existing in the numbers theory, the high level programming languages allow the definition of new artificial data types, e.g. *abstract data types* [1].

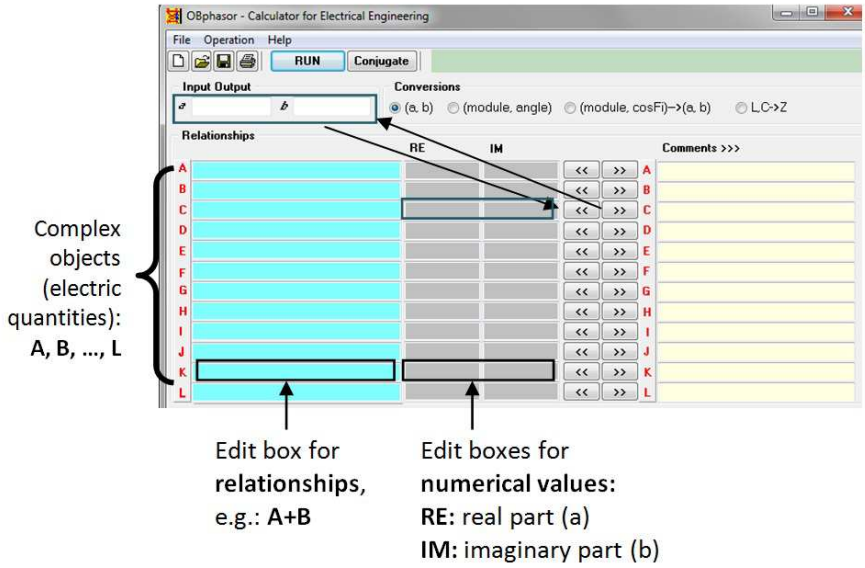
As we know, it is possible to represent a sinusoidal quantity through two real numbers in two manners:

- ***a rotating vector (phasor)***: with module (V) and angle θ (phase);
- **a *complex number***: with real part (a) and imaginary part (b);



The mathematical model for complex quantities as abstract data types, containing the domain, the operations set and further information, is given in [2]. The defined mathematical structures were implemented as objects in an original software which allows manipulating complex quantities by directly using of common operators like "+", "-", "*" and "/".

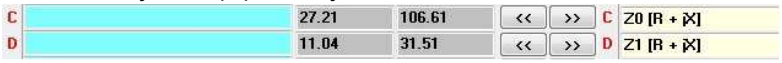
Short presentation of the program



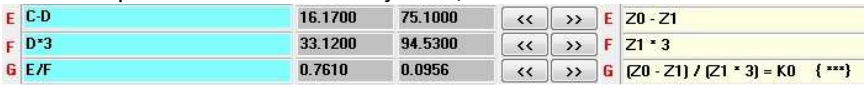
For any electric quantity (A, B, …, L), we can assign a complex **numerical value (RE, IM) or** a **relationship** (written into the edit line).

How it works? A practical example for electrical engineering.

Suppose that we know, for an electric power line, both impedances, positive sequence (Z1) and zero sequence (Z0):
Z0 = 27.21+j106.61 (Ω) → object **C**
Z1 = 11.04 + j31.51 (Ω) → object **D**



We can compute the earth-return compensation factor: K0 = (Z0-Z1) / (Z1*3) by writing the required relationships in the edit lines of objects E, F and G. Click on **RUN** button.



K0 = 0.7610 – j 0.0956 → object **G** (as a complex number)

We can see **K0** as a phasor too → Move the value of **G** in **Input Output** panel and click on radio button (module, angle).

References

1. Bogdan Tomoiagă, Mircea Chindris, Andreas Sumper, Antoni Sudria-Andreu: ***Object oriented backward/forward algorithm for unbalanced and harmonic polluted distribution systems***. Electrical Power Quality and Utilisation (EPQU), 2011 11th International Conference on, Lisbon; 10/2011, ISSN 2150-6647.

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2. Mircea Chindris, Antoni Sudria-Andreu, Ciprian Bud, Bogdan Tomoiagă: ***The load flow calculation in unbalanced radial electric networks with distributed generation***. Electrical Power Quality and Utilisation, 2007. EPQU 2007. 9th International Conference on; 11/2007, ISBN 978-84-690-9441-9.

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