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One-Way Electricity

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Abstract

Water enters the fountains of Peterhof naturally through a system of locks, canals, reservoirs and springs from the Ropsha heights, and the height of the jets can vary depending on their filling. Pumps were never used in Peterhof. Tourists from all over the world come to see this fountain near famous palaces. The water delivery uses one tube pipe descending from the nearest hill. After the water comes down again in the lake, it flows out through the drain pipe. So even this very high fountain is working without any motor and comes back tube. And many fountains in the world are built according to this method. For hundreds of years of the existence of fountains, it never occurred to anyone to build a second pipe to return the water up the hill. So obviously, it is a one-way method.

Keywords

One Wire, Single Line, Converter, Inverter, Fountain, Roundtrip

1. Introduction

There are systems in existence with movement in one direction as well as systems with back and forth movement.

In transportation, this division is understandable and habitually common. But there are many other systems where one can choose one of these two systems.

In electrical systems, designing this can help in developing a system which corresponds better to the goal of the system and its structure.

Below we consider systems where this is not obvious. A better known example can be water delivered forte fountains. In this case, it can be done by different methods.

In the Peterhof-suburb of the beautiful city of Sankt Petersburg, there exists the famous Samson fountain (Figure 1).

Water enters the fountains of Peterhof naturally through a system of locks,

Figure 1. The fountain Samson in Peterhof https://gavailer.livejournal.com/285982.html.

canals, reservoirs and springs from the Ropsha heights, and the height of the jets can vary depending on their filling. Pumps were never used in Peterhof.

Tourists from all over the world come to see this fountain near famous palaces.

The water delivery uses one tube pipe descending from the nearest hill. After the water comes down again in the lake, it flows out through the drain pipe. And many fountains in the world are built according to this method. For hundreds of years of the existence of fountains, it never occurred to anyone to build a second pipe to return the water up the hill. So obviously, it is a one-way method.

2. Common Systems Are Roundtrip Systems

The main goal of this article is to show that in electric systems there can be other methods of movement.

As always, the main change must be not in scheme, but in consciousness awareness or in approach. We don't need to transfer energy through the wire and to load and then return the signal to the source. We have to transfer energy from source to load only. So, we need a one-way method. And if so, then one wire should be enough.

Let us compare the common two-wire scheme (Figure 2) with the one wire scheme [1], with the same conditions (Figure 3). The two-wire scheme is the traditional one phase line.

The main parameter of these schemas is gain (G) as output power divided by input power. In first scheme $G = (I \times U)/(I^2 \times R) = 1$

One can see on Figure 2 that currents in both wires have opposite polarity.

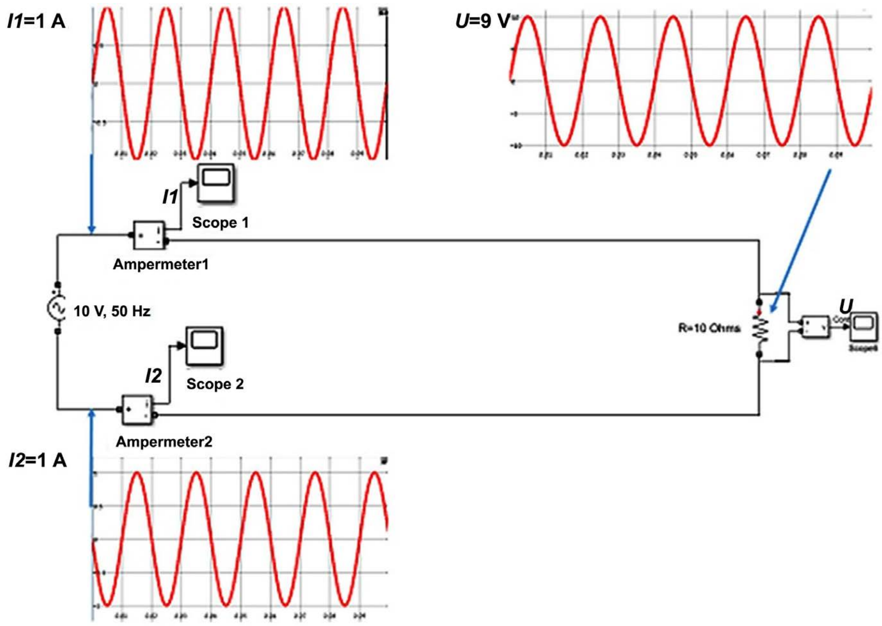

Figure 2. Normal one-phase system.

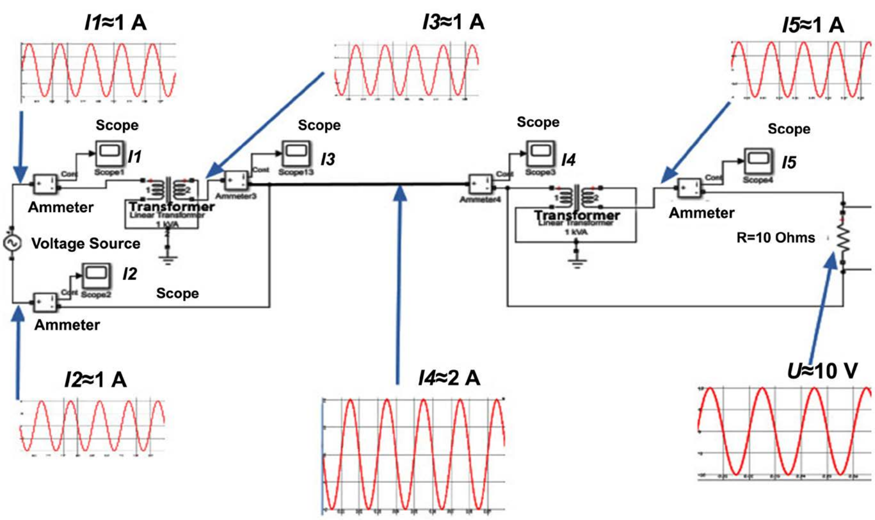

Figure 3. One wire scheme with one phase output.

Therefore, we can say, that both currents transmit energy from left to right, but the current in the bottom wire has the opposite polarity.

3. One-Way Systems Schemas and Simulations Results

In order to transmit energy in one direction, we can change the current polarity in this wire. This we can do with a transformer with opposite windings [1]. We can combine both currents now and give this new one current to load. But in many cases, the load has two wires input.

So, we have to go back to one-phase (two wires) signals. For this, we can divide a single wire into two wires for this purpose and one of them will be used as invertor, as one can see on **Figure 3**.

The polarity change can be made in the wires. For example, scheme on Figure 4 is identical to scheme on Figure 3.

For simulations the transformers in Figure 3 and Figure 4 had parameters shown in Figure 5.

In schemes on Figure 3 and Figure 4 $G = (I \times U)/(I^2 \times R) = 1$ also.

In one-way schemes on Figure 3 and Figure 4 we transmit the same power like as on a two-wire scheme on Figure 2. Where the current in single wires on Figure 3 and Figure 4 is twice as strong as on Figure 2 the single wire on Figure 3 and Figure 4 is twice as short as the wires in Figure 2. This means that we will have the same losses in wires if we use the same type of wire in one wire system like in two-wire system.

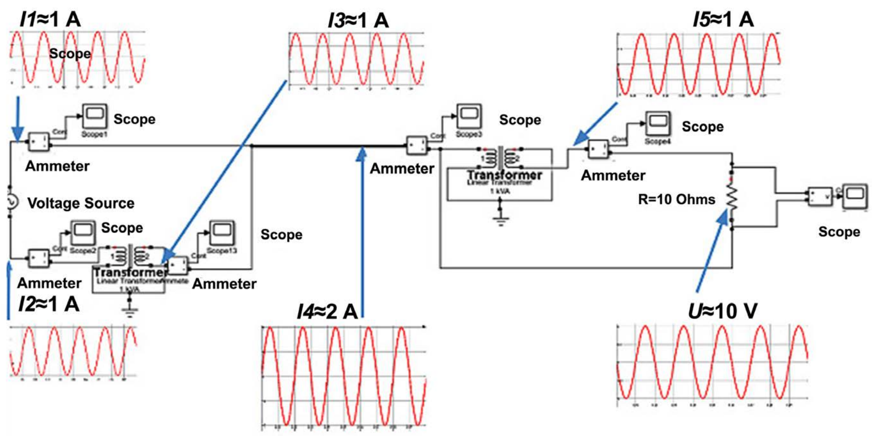

Figure 4. One wire scheme with inverter is located in lower line.

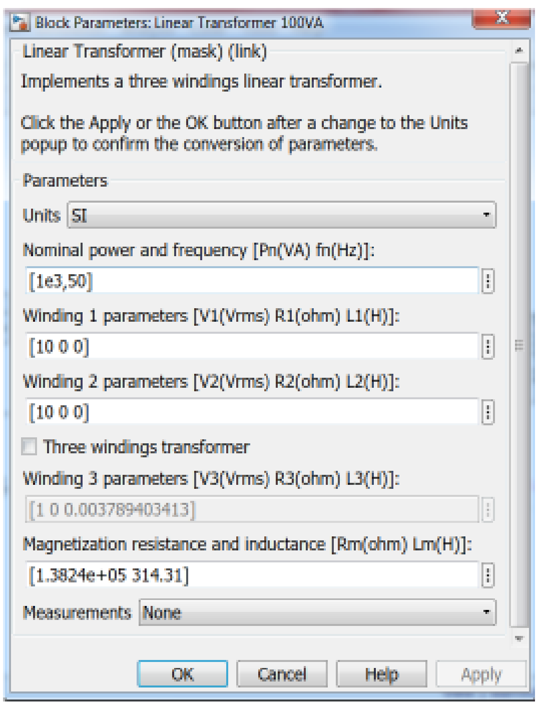

Figure 5. The inverters transformers parameters.

4. Three Phase One-Way Systems

The same results were received in three-phase systems as well. Converter 3 - 1 in **Figure 6** [2] allows transmitting a three-phase signal using one wire, which is the same like each wire in three-phase system. We receive that because the voltage in an equivalent one wire system equals linear voltage of a three-phase system. But linear voltage of the three-phase system is 1.7 times more than phase voltage.

Thus, in a one-way system, the same wire will withstand a power of one and seven tenths squared (three times) more than in a conventional three-wire circuit. Conversion of a single-wire signal into a three-phase signal can be performed according to the diagram in **Figure 7** [2].

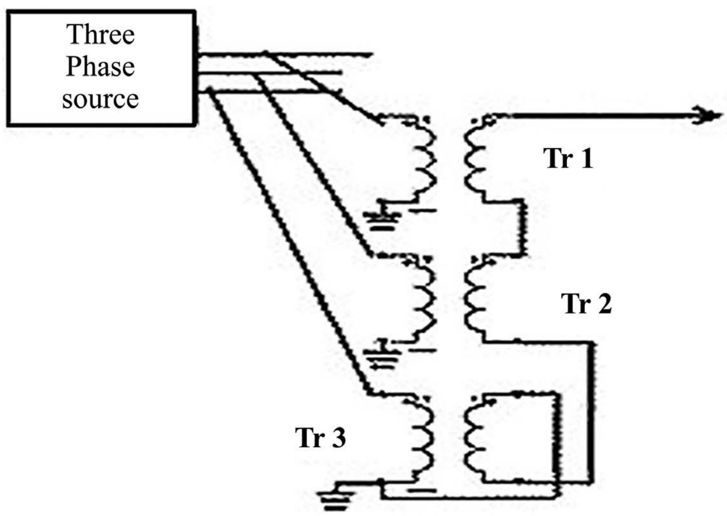

Figure 6. The converter 3 - 1 scheme.

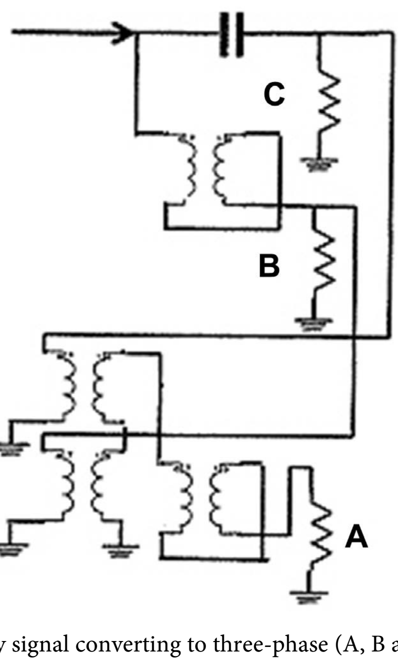

Figure 7. One-way signal converting to three-phase (A, B and C) signals.

5. Conclusions

The one-way system has the following advantages:

- It is known, that in electrical transportation systems the wires are the most expensive part. This system is three to four times cheaper;
- It can be located underground. A three-phase system needs distances between wires. Therefore, underground wires are practically impossible;
- One wire system doesn't need intermediate stations. The proposed one wire system is a balanced system [3]. Reactive power does not arise in it. In order to compensate for the reactive power in three-phase systems, expensive intermediate stations are necessary;
- The one wire system uses the same wire as in one phase or in three-phase systems;
- Low level corona effect.

And two more important conclusions.

First. There are many serious problems in electricity transmitting today. One of them is large distance between source to plaice of using it.

But now it is not a difficult problem. Take one wire from your three-phase system and stick it into a concrete underground pipe.

Second. **If you want to build a fountain, you do not need to build a pipe to bring the water to place, from where we take it.**

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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[3] Bank, M. (2018) Electrical Energy Transmission by Several Wires and Reactive Power Problems. *Engineering*, **10**, 329-335. https://doi.org/10.4236/eng.2018.106023