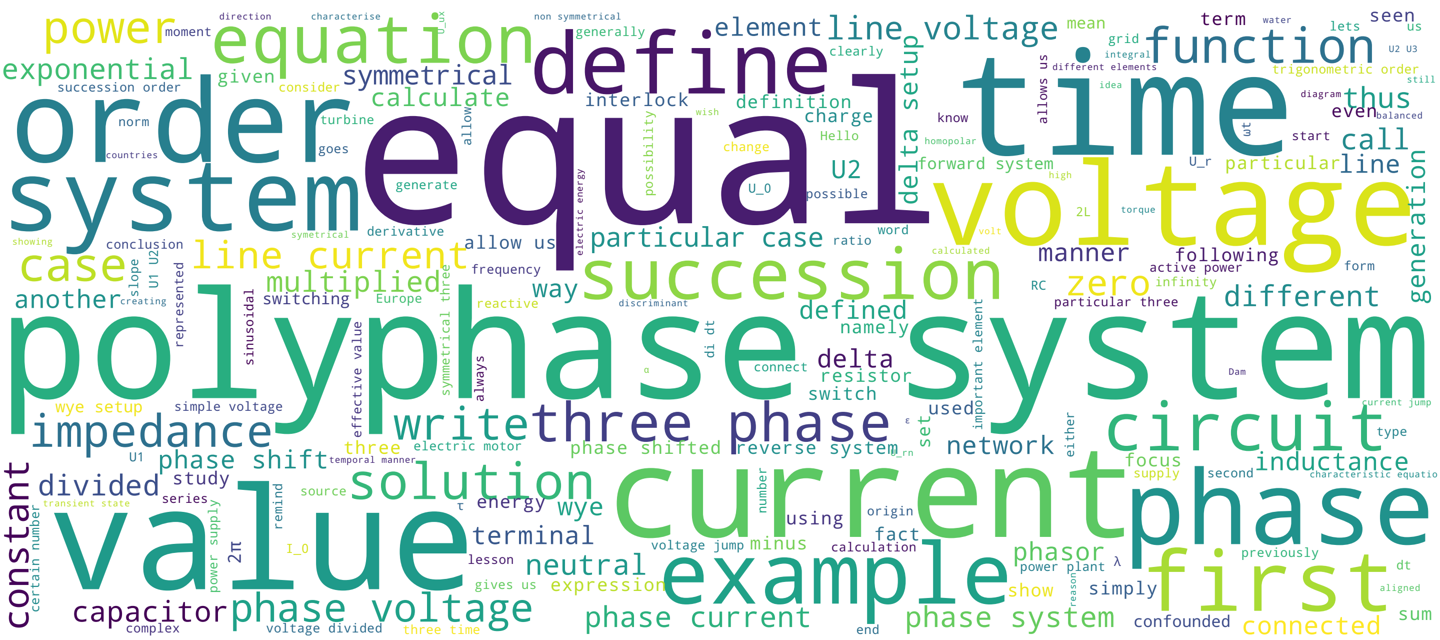
SYSTÈMES TRIPHASÉS

SYSTÈMES POLYPHASÉS

LEÇON 2

Électrotechnique II
Yves PERRIARD & Paolo GERMANO
Laboratoire d'Actionneurs Intégrés



Video

EPFL

INTRODUCTION

- Introduction
- Systèmes polyphasés
  - Définition
  - Exemples
- Conclusion

Electrotechnique II

Hello In this second lesson we will focus on the generation of a polyphase system and define the different elements that charecterise the idea of having a polyphase system We will then after a brief introduction describe these polyphase systems, define what a polyphase system is and show several examples and end on a conclusion.

Notes

Summary

0m 04s

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Système polyphasé : m grandeurs (tension ou courant)
même fréquence et sinusoïdal

Symétrique : valeurs efficaces égales

k : ordre de succession des phases   déphasage $= k \frac{2\pi}{m}$

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Polyphase systems are in fact a set of a certain number of values Thus, we can define a polyphase system as the set of m values of voltage or current. Further more, the definition of a polyphase system of these m values is that they all have the same frequency Naturelly in a sinusoidal manner Further more, if we now wish to characterise this system and give more descriptors, we can say that a polyphase system will be symetrical or balanced if the effective value (RMS) of the values are equal. We will now also define the order of succession of the phases this order, we shall call it "k" this order of succession of the phases will also allow us to get the corresponding phase shift angle between the different voltages or values of the polyphase system. In order words, this phase shift will be equal to this order, k, multiplied by 2π/m m being the number of values of the polyphase system. Will shall see further on that generally we will focus on a three-phase system but that it is possible to have networks of polyphase systems of 2, 4, 5, or even more phases. Another interesting element is to define the order of succession of the phases or in which direction this succession happens.

Notes

Summary

0m 31s

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Système polyphasé : m grandeurs (tension ou courant)
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Symétrique : valeurs efficaces égales

K : ordre de succession des phases déphasage $= K \frac{2\pi}{m}$

Système direct : sens trigonométrique négatif
" inverse : " " positif

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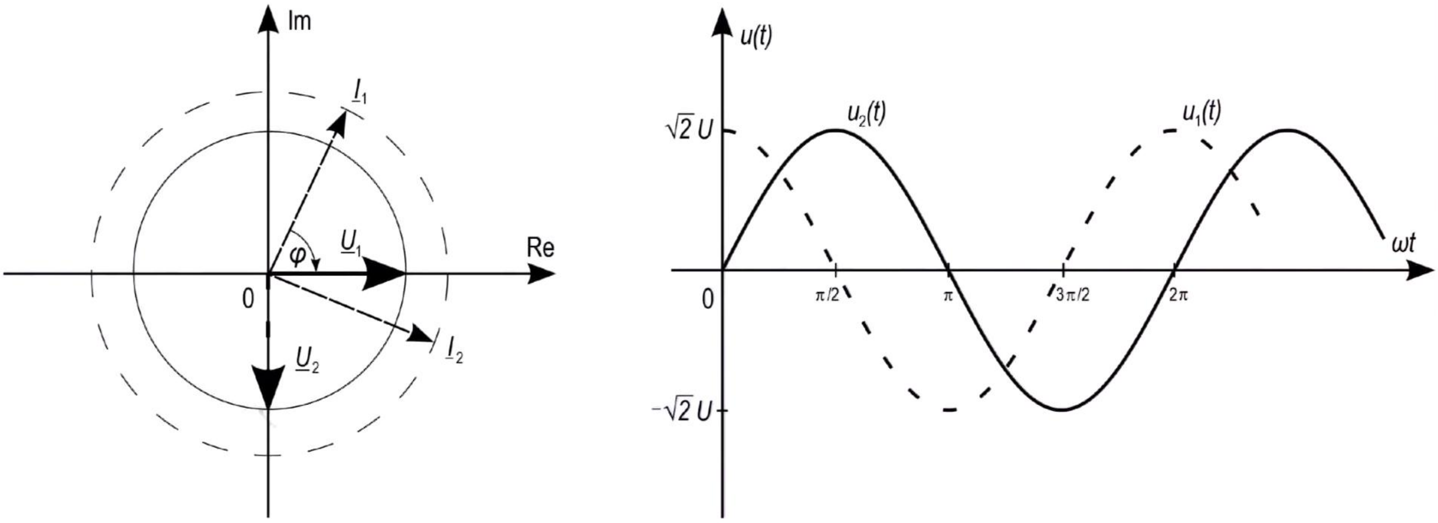
Thus, the phase change will allow us to define the forward system or the reverse system. First of all, the forward system will be defined as the succession of phases in the negative trigonometric order Logically, the reverse system will then be in the forward trigonometric order. We shall now see an example that allows us to show different polyphase systems and what is their succession order at this moment.

Notes

Summary

2m 05s



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Before that, I will show you a simple diagram that illustrates two voltages, you have here U2 in a temporal manner and, another voltage U1 phase shifted compared to U2. I remind you that this temporal diagram can be represented in the complex plan by vectors called phasors and thus the U1 vector aligned here with the origin 0 of the omega(t) find themselves with this vector on on the real part and U2 phase shifted by π/2 finds itself here. We can clearly see the order of succession of the phases that goes from U1 to U2, first of all m is equal to 2 we only have 2 values here the order is equal to 1 since we have forward succession order. So here is an example of a two-phase system, we can call it two-phase because we have only two phases and here for example 2 currents associated with a circuit to which this polyphase system could be connected to.

Notes

Summary

2m 41s

Système k = 0

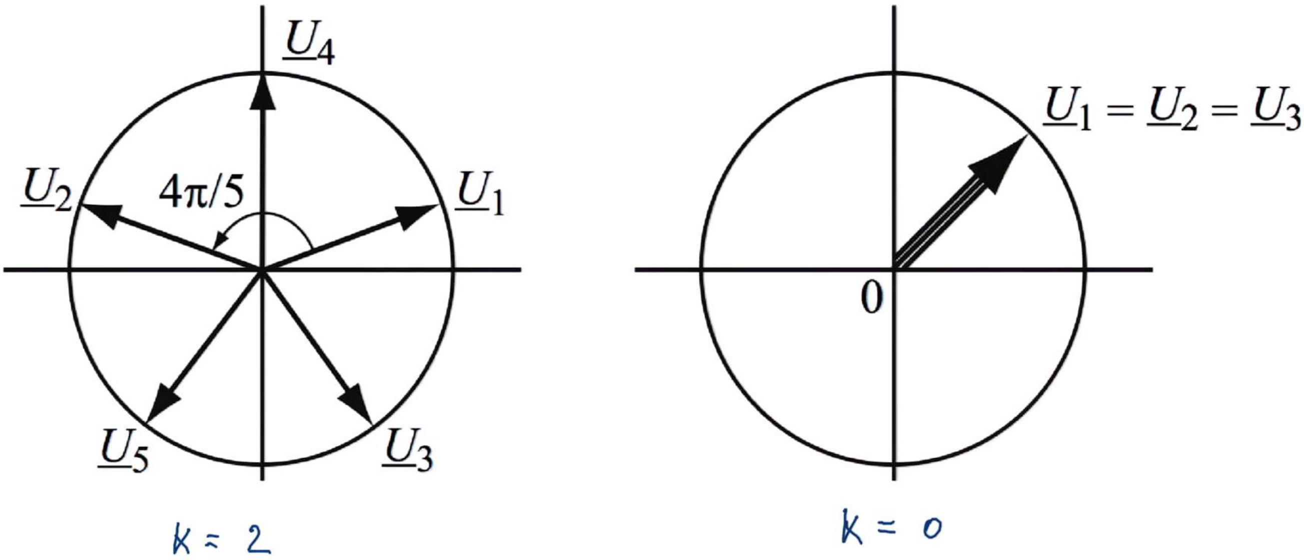
Cas particulier : Système homopolaire

We will also study a particular case before showing two more examples. It's when the order of succession, k, is equal to zero. A system with an order k equal to zero means that all the values are aligned on themselves from the perspective of the phase. In other words, all the phasors are confounded with each other. For this particular case we will say that the system of order 0 is homopolar.

Notes

Summary

3m 49s



Electrotechnique II

You have here two examples of polyphase system networks. The first: you can see here that we have 5 values, all of equal RMS amplitudes. So 5 values mean that we have m = 5 phases. the order of succession is 2, so k = 2 in this particular case since we have first of all, U1 followed by U2 then U3, U4, and finally U5. Thus for this system k = 2. You have here a classical example of what I've mentioned earlier, the very particular case where all the values U1, U2, U3 are confounded on the same phasor. We shall thus call this polyphase system "homopolar" and the order of succession of the phases k = 0.

Notes

Summary

4m 25s

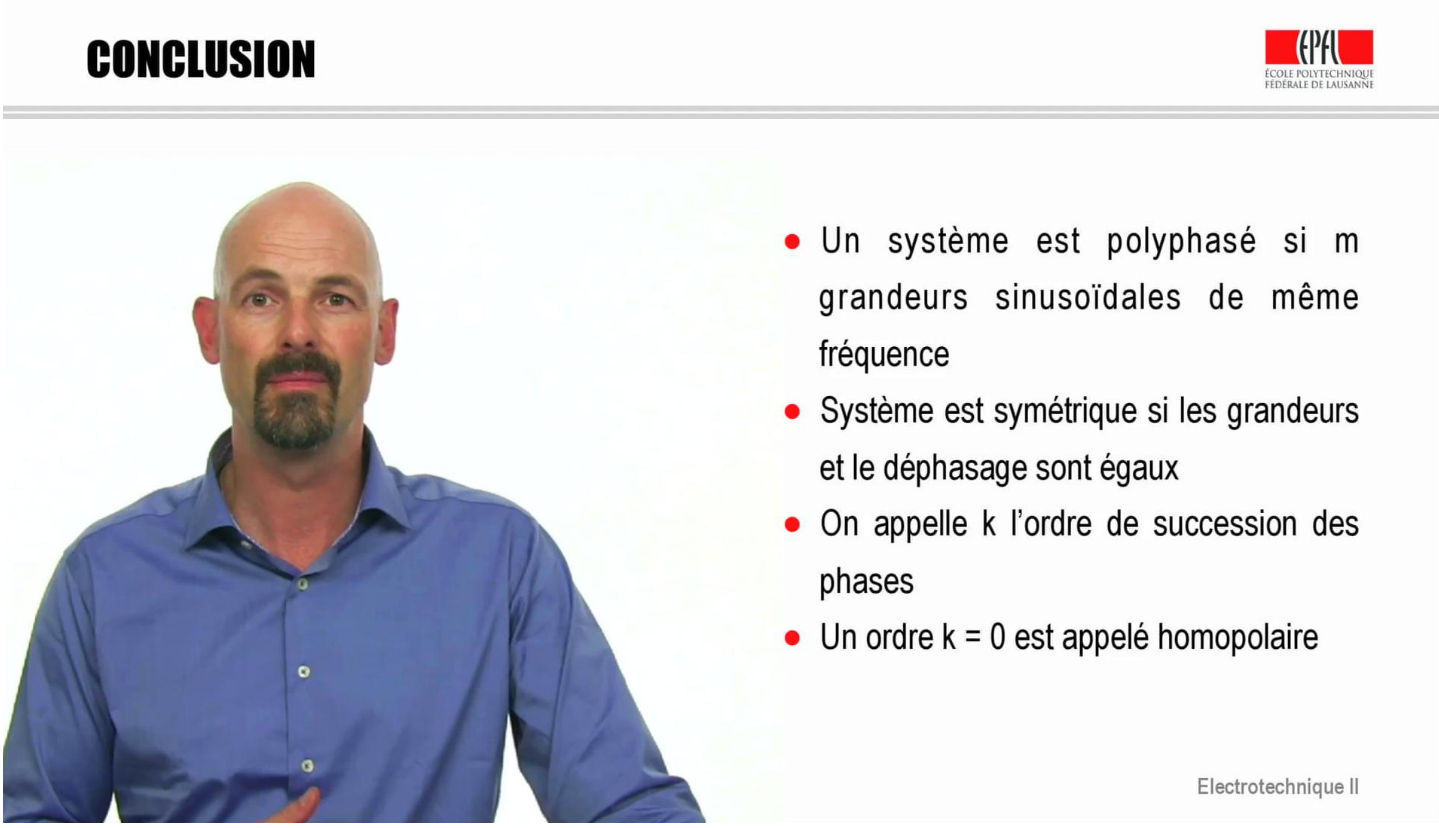
SYSTÈMES POLYPHASÉS

The generation of energy transmission is more effective in polyphase systems, it is the reason why in the majority of countries a polyphase system is used to transmit electric energy. There is also another reason that a polyphase system is used: it is the fact that we can generate a rotating field, thus generate a electromechanical conversion by using a polyphase system. We can explain, demonstrate that the generation of a polyphase system offers the possibility of creating a magnetic wave rotating inside an electric motor. Which is the beginning or basis of mechanical generation in a system. Another very important element in polyphase systems for those that are symmetrical, in particular three-phase systems is that the instantanous power in these systems is constant Everything being symmetrical the power being constant, we can negate all vibrations linked to a possible mechanical alteration or mechanical pulsation linked to a torque that is created in a manner in a manner where there is a dissymmetry.

Notes

Summary

5m 24s



It is clear that in Europe we have the necessity of having a polyphase system, in particular three-phase, that allows an easy electrical, mechanical transformation for all objects requiring the placing of an electric motor In conclusion the system is polyphase if we have m values of same frequency we will say that a system is symmetrical is all the values and the phase shift between these values is equal. And finally, we will call k the order of succession of the phases and in particular when it is equal to zero we will say that the system is homopolar

Notes

Summary

6m 39s