Mechanical angle, electrical angle, and Park transformation

Asked 5 years, 7 months ago Modified 5 years, 2 months ago Viewed 2k times

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I have a question about the electrical angle and mechanical angle of the BLDC motor.

The motor has 8 poles. We have

Electrical angle = number of pole pair * mechanical angle

This would mean that if the mechanical angle covers 45 deg, the electrical angle has spanned 360 deg. After that, should I reset my electrical angle to 0 and start counting again, or it's acceptable if the electrical angle keeps increasing?

I use the electrical angle in the Park transformation for calculations.

microcontroller motor

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edited Oct 25, 2017 at 10:03
raggot
415 ● 4 ● 16

asked May 21, 2017 at 10:15
rajesh
417 ● 4 ● 14

1 Robert Park was a man- please capitalize his name in your title and text. – Spehro Pefhany May 21, 2017 at 10:37

I am sorry. Can i edit now. – rajesh May 21, 2017 at 10:49

1 Answer

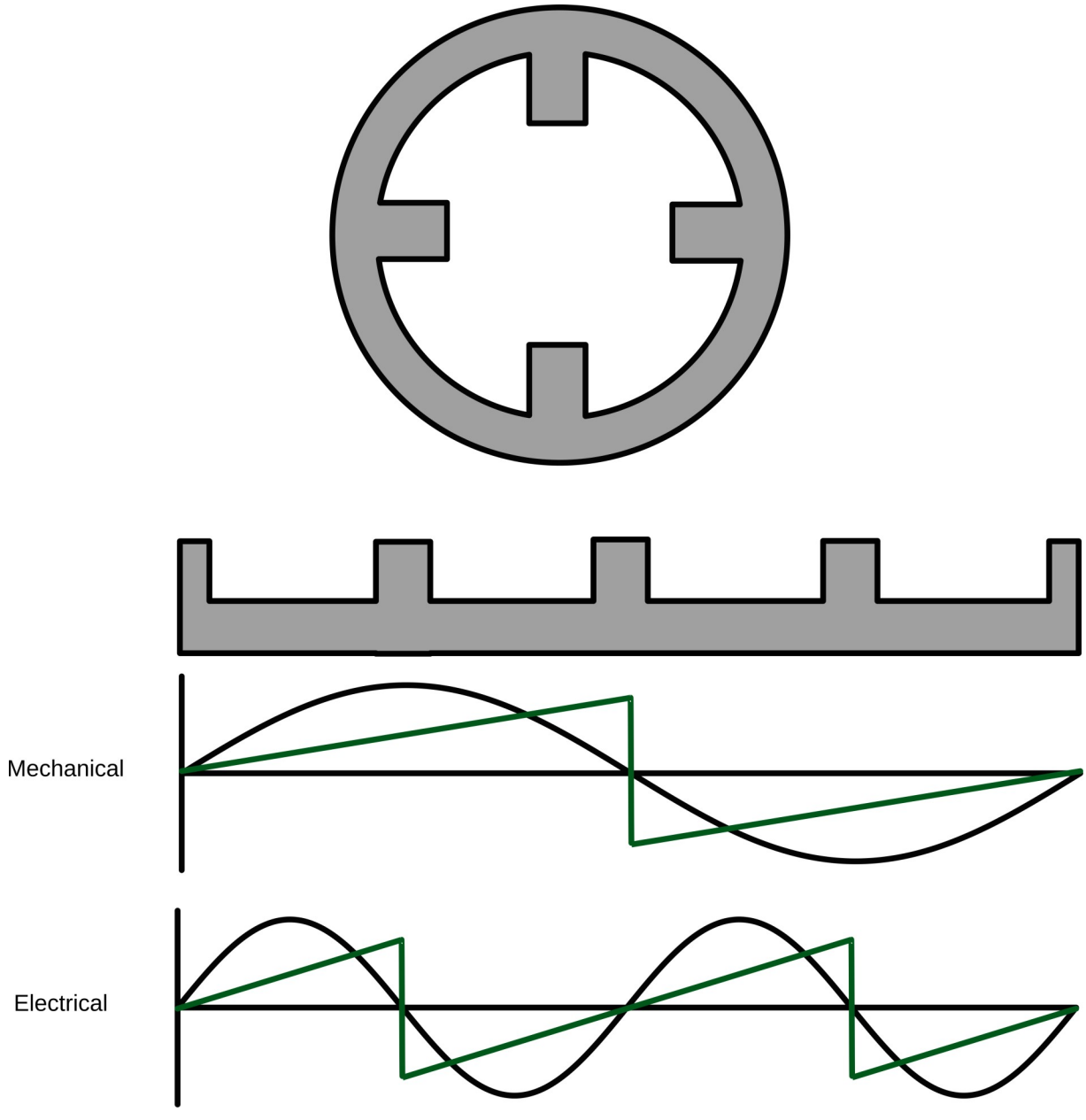
Sorted by: Highest score (default)

What is key is the electrical frame of reference. Every pole-pair the cycle completes.

For a 6 pole machine, 3pole-pair, this wrap (in the mechanical frame of reference) is every 120degrees

For an 8 pole machine, 4pole-pair, this wrap (in the mechanical frame of reference) is every 90degrees.

If you unwrap a machine stator (see below for a 2pole-pair) the difference becomes clear



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answered May 21, 2017 at 10:58

user16222

No i am not able to understand. – rajesh May 21, 2017 at 11:06

What exactly don't you understand – user16222 May 21, 2017 at 11:11

If my mechanical angle is 360 then electrical angle will be 8 * 360 degrees, if it is 8 pole pair. Please help. – rajesh May 21, 2017 at 11:12

The electrical angle would be 0 or 4*360 (as 0=360) if you were to unwrap the angle. I do not know you low level implementation but the usual method is to calculate mechanical, multiply by pole-pair count & ensure the register wraps – user16222 May 21, 2017 at 11:15

void encoderInterrupt(void) { encoderincr++; mechanical_angle = encoderincr * 360 / ENCODER_COUNTER; /* ENCODER_COUNTER is the number of counts for one revolution */ if(mechanical_angle > 360) { encoderincr=0; } electricalangle = NOPOLEPAIR * mechanical_angle; } – rajesh May 21, 2017 at 11:51