# Re: resolve to perpendicular components, because they are independent

***Source:*** http://sci.tech−archive.net/Archive/sci.physics/2006−01/msg02132.html

- *From*: mmeron@xxxxxxxxxxxxxxxxxx
- *Date*: Fri, 20 Jan 2006 08:55:20 GMT

In article <1137745432.546723.23260@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>, "Ken S. Tucker"
<dynamics@xxxxxxxxxxxx> writes:
>
>kenneth.bull@xxxxxxxxx wrote:
>> Hi Physicers,
>> Any help will be greatly appreciated.
>> It is my understanding that we often resolve vectors (like force,
>> velocity) into perpendicular components because they are so called
>> "independent." If one component changes value, it doesn't affect the
>> value of the other pependicular components (I guess this is where
>> "Independent comes from").
>> Yet I have been recently shown how to resolve vectors (force) into
>> components that aren't perpendicular using a reverse−parallelogram
>> rule. Say a force is acting on a structure like < at the left point, I
>> have to resolve it into two forces alone the two branches (not
>> orthogonal). I encountered this in my self study of certain questions,
>> so I don't really have anyone reliable to ask why this is viable in
>> light of my previous knowledge of "independent vectors need to be
>> perpendicular."
>> Can someone shed light on any of this?
>
>I think you want to study the *Kronecker Delta*. I accept that
>a number of axes x^1, x^2...x^n are *independant* if
>((& is partial))
>
>&x^a / &x^b = 1 if a=b, and 0 if a=/=b.

Everybody (well, nearly everybody) is confusing the poor guy. Let me
try to set the record straight.

Mathematically, a set of vectors is independent if non of them can be
expressed as a linear combination of the other ones. For the 3D case
you care about it simply means that 3 vectors are independent if
they're not lying in the same plane. Translating to axes it means the
same, you cannot have 3 axes lying in the same plane, otherwise the
angles between them are arbitrary. So, no, independent vectors do not
need to be orthogonal.

But, but... non orthogonal axes are a pain. Many of the formulas you
use implicitly assume orthogonal vector base. Once it is not
orthogonal then, to begin with the scalar product isn't given by the
simple formula (a1,a2,a3) /dot ((b1,b2,b3) = a1*b1 + a2*b2 + a3*b3.
You've a more complex formula instead, one that is taking the angles
betwee the axes into account. Vector product is even worse. And when
you get to vector operators like grad or curl, all hell breaks out.

So, I'll second Timo's advice, i.e. unless you've a good enough reson
to go non−orthogonal, don't. But, if you choose to do, it is legit
(though painful).

Mati Meron | "When you argue with a fool,
meron@xxxxxxxxxxxxxxxxx | chances are he is doing just the same"
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- ***Follow−Ups***:
  - ***Re: resolve to perpendicular components, because they are independent***
    - *From:* Timo Nieminen
  - ***Re: resolve to perpendicular components, because they are independent***
    - *From:* Ken S. Tucker

- ***References***:
  - ***resolve to perpendicular components, because they are independent***
    - *From:* kenneth . bull
  - ***Re: resolve to perpendicular components, because they are independent***
    - *From:* Ken S. Tucker

- Prev by Date: ***Re: Fair pro + contra with the Newton twins***
- Next by Date: ***Re: resolve to perpendicular components, because they are independent***
- Previous by thread: ***Re: resolve to perpendicular components, because they are independent***
- Next by thread: ***Re: resolve to perpendicular components, because they are independent***
- Index(es):
  - ***Date***
  - ***Thread***