Re: Mobile S−Rotor!

Source: http://sci.tech−archive.net/Archive/sci.energy/2005−12/msg00231.html

* *From*: "TomGee" <lvlus@xxxxxxxxxxx>
* *Date*: 16 Dec 2005 00:07:52 −0800

daestrom wrote:
> "TomGee" <lvlus@xxxxxxxxxxx> wrote in message
> news:1134351624.751078.115760@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
> > daestrom wrote:
> >> "TomGee" <lvlus@xxxxxxxxxxx> wrote in message
> <snip>
> >>
> > So you're saying that the amounts must be equal and so no savings of
> > fuel or emissions will occur, correct? You're saying that the veh.
> > engine will use the same amount of fuel to push the rotor to get say 14
> > hp from it as it does to get that from its alternator? You could be
> > right, but I hope not. My calculations gave me 18.25 Newtons,
>
> Uh, *what* is 18.25 Newtons? The additional drag added to the vehicle? Or
> ??
>
Yes, the additional drag added by my device to the vehicle, or rather
the addit'l power force needed to push my rotor at 60 mph.
>
> > but I
> > was advised the drag coefficient figure I used was too high. The
> > helper estimated roughly a Cd of 0.3 at 60 mph and got 33 N, which is
> > just over 1 hp.
>
> So a lower Cd raised the force?? I'm not sure what you're saying here.
>
Apparently.
>
> > The lowest hp estimate I have found of the hp required
> > by a car alternator is 4 hp.
>
> If your rotor is spinning at 70 RPM (7.33 rad/sec), then to develop 1 hp, it
> has to have a torque of
> torque = power/omega = 746/7.33 = 101.8 N−m. With a blade width of 8", that
> works out to 501 N at the tip. More if you calculate from the blade center.
>
I would think it would be less from the blade center since the longer
the radius the more torque developed.
>

> If you could get the RPM up to 700, then you would only need about 50 N at
> the blade tip to make 746 watts. But it would be difficult to get 700 RPM
> on an S−rotor (even a 'shielded' one).
>
Mine will not go over 120 rpm at 60 mph, I would guess.
> >
> > My device is open halfway its height along its length, where the rotors
> > turn in reaction to the momentum of the slipstream. Thus, since my
> > device does not present a solid bluff surface to the slipstream, it
> > should use less than the estimated 1 hp, no?
>
> Use? So are you talking about the added hp needed to propel the vehicle
> with your device?
>
Yes.
>
> what I understand, the area open for air to enter
> and do work on your rotor is 8" by 4', right? So you believe that 1 hp can
> propel your device, with an opening of 8" x 4' through the air at 60 mph?
>
No. I estimate an opening of 8" narrowing to 3" at the rotor's
perimeter with a length of about 38"− 40". The bluff surface of the
blades is 15" square each.
> <snip>
> >> >> So, *if* a particular, large alternator requires 27.3435222 hp from
> >> >> the
> >> >> belt
> >> >> drive off an engine to drive it, your S−rotor would have to develop
> >> >> the
> >> >> same
> >> >> 27.3435222 hp to drive it. How big would your 'wind device' need to
> >> >> be
> >> >> to
> >> >> develop 27.3435222 hp?? How much increased drag would such a device
> >> >> induce
> >> >> on the vehicle? How much more hp would be needed from the main engine
> >> >> to
> >> >> push this extra drag through still air? (I'll give you a hint, it's
> >> >> more
> >> >> than 27.3435222 hp).
> >>
> > Not according to the figures I provide above. It will take less than 1
> > hp to push it through the slipstream at 60 mph. The blades will not
> > increase that figure no matter how much current the alt. has to produce
> > because they are resisting the air less than a stationary wall does.
> >> >>
> >> > So according to you, it will take more hp to push my device through the
> >> > slipstream than it takes for the veh. engine to turn its own
> >> > alternator, correct?
> >>
> >> Yep. Because your S−rotor device has to develop the same hp that the

> >> engine
> >> supplied to the engine−belt driven alternator, and to develop that much
> >> hp,
> >> the engine will have to expend more hp.
> >>
> > Well, show your calculations about that and we can compare them with
> > those I've given you.
>
> I'm talking here about the amount of hp the S−rotor shaft must develop and
> supply to the alternator, not the engine hp needed to push the S−rotor
> through the air. If the alternator needed x hp from the engine shaft to do
> its job, then it stands to reason it would need the same x hp from the
> S−rotor shaft to do the same job. For the S−rotor to develop x hp, it must
> extract that power from the wind/slipstream.
>

I am not sure that the hp is the critical factor in all this. It seems
to me that it depends on the amount of torque capacity of each device,
and that may vary in terms of hp. Other factors include the efficiency
levels of the rotor and the alt.

>
> If we take one of your estimates, that the alternator is a 4 hp load on the
> engine, then it stands to reason it would act as a 4 hp 'load' on your
> S−rotor shaft when it is disconnected from the engine and connected to your
> S−rotor. So your S−rotor must develop 4 hp somehow. That would be 2984
> watts at the shaft (do you prefer we stick to metric??).
>

A more efficient rotor/alt. system can develop the alt. load produced
by the veh. alt. using less hp than the engine uses to turn its own
alternator.

>
> Now, the wind/slipstream is flowing by at 26.7 m/s, and air has a typical
> density of 1.25 kg/m^3. If we ignore all limits and losses, and extract
> *all* the kinetic energy from each kg of air (something we can't really do,
> but this gives a conservative calculation), that's ((1/2)*1kg * (26.7
> m/s)^2) =356.4 Joules from each kg of air. So to get 2984 watts (J/s), we
> would need to intercept 8.37 kg of air every second. That's about 6.7 m^3/s
> of air. Moving at 26.7 m/s, that would mean a flow cross−section of
> 0.250936 m^2 (your 4' long by 8" high opening).
>
> But how do you extract all the kinetic energy from each kg of air? You
> can't. You have to leave some kinetic energy in the air, if it has a
> velocity of zero it would be 'stuck' right inside the device. You can say
> the next kg 'pushes' it, or whatever. But the simple fact is, it has to
> leave. And for it to leave, it must have some kinetic energy that it takes
> with it.
>

Yes. We want it to leave, and while it is being pushed out by the
incoming air it is also being sucked out by the low pressure at the
exit opening. What happens to air that has had some of its energy
removed is that it expands, creating a low pressure area. I would not
claim that any device can extract all kinetic energy from anything, so

the most I would hope for with my improved device is 75% − 80% KE
extraction.
>
> And that is the crux of the issue. If you remove a large amount of kinetic
> energy per kg, the velocity of the air leaving is low, so the incoming air
> is limited by how fast the outgoing air leaves. If you remove only a little
> kinetic energy per kg, the air leaves quickly, so incoming air flows in
> quickly.
>
As I understand it, a fluid slows when it's rate of flow is increased,
and it expands when energy is extracted from it. I have designed my
device to funnel the air from an 8" x 3" opening into a 3" x 3" opening
at the rotor perimeter, but I will try it without the funnel if it
presents too much of a decrease in its speed.
>
> But you get so little energy from each kg. There is a 'sweet
> spot' in the middle, where you extract enough energy from each kg, yet have
> enough kg/s flow, that power is maximized. Find that 'sweet spot'. Guess
> where you end up.
> >> >> >>
SNIP
> >> >> >>
> >> >> >> But if your box only adds 1 to 2 hp to the vehicle engine demand,
> >> >> >> it
> >> >> >> cannot
> >> >> >> develop more than 1/2 to 1 hp output. So it couldn't drive even a
> >> >> >> 100
> >> >> >> amp
> >> >> >> alternator. Can't get out more than you put in.
> >> >> >>
> >> > I cannot figure out what you mean by your statement above. Are you
> >> > saying that my device can only get 1/2 hp of what it takes the veh.
> >> > engine to push it?
> >> Yep.
> >> > How do you figure that?
> >> With some math ;−) The Betz limit guarantees you won't get more than 59%
> >> of
> >> the power that it takes to push your device through the air. So if it
> >> takes
> >> 1 extra hp to push the added drag, then that amount of added drag cannot
> >> possibly generate more than 0.59 hp.
> >>
> >> > You are confusing two
> >> > distinct and non−equivalent principles as being applicable to the same
> >> > situation.
> >>
> >> Really? Which two?
> >>
> > The Betz equations and the first law of thermaldynamics.
>
> No, I am quite sure that I applied the Betz limit correctly as it applies to

> any device that extracts mechanical energy from a free−flowing fluid. The
> first law of 'thermaldynamics' just says energy is conserved.
>
Sorry about the typo. The wind energy used by an airfoil is conserved
in the lift it provides, but very little of the wind in the swept area
is used by an airfoil so 41% escapes by unused. In an open S−rotor,
all of the air that strikes one blade is used against both of the bluff
surface blades, except for the amounts that strike against the blade
moving counter to the wind flow as it moves into the air flow. Thus,
in my enclosed S−rotor, I see no reason why I cannot expect to be able
to use almost all of the air directed against both blades.
> <snip>
> >> > No, it does not.
> >>
> >> Does to...
> >> Does not...
> >> Does to...
> >>
> >> Rather tiresome.
> >>
> > Yes, it is, but you started it by not providing support for your
> > opinion and ignoring the detailed reasons I provided to support my
> > opinion.
>
> Your 'detailed reasons' were not very 'detailed'. You claim it doesn't
> apply because a web page describing the Betz limit discussing it shows a
> picture of a conventional axial−flow turbine. You claim that since the
> S−rotor blade tip is much slower, the Betz limit doesn't apply. You claim
> that since your interpretation of 'swept area' can only be applied to
> 'airfoil' turbines.
>
Um, your last sentence above is fractured, but I get its gist. The
first two "claims" you note above are untrue. I said nothing about a
picture, nor did I claim the limit does not apply because an S−rotor's
tsr is much slower. Those two errors are huge mistakes in your
understanding of what I'm trying to explain. Your last sentence is
correct, but I did not make up the definition of it. Surely you do not
presume to claim it means otherwise than what I have said it means?
>
> I explain that the Betz limit is derived without reference to the workings
> of the wind device and is based on the conservation of mass, momentum and
> other factors unrelated to the detailed workings of the machine.
>
And that's false.
>
> If you want some nice treatises on it, try:
> "Engineering Thermodynamics with Applications 3rd Edition" Burghardt
> "Engineering Thermodynamics 4th Edition" Burghardt/Harbach
>
No. I am not an engineer. If I was, I would not be exposing my ideas
to the trolls who lurk here nor to the dolts who think they know what

they're talking about. You can quote passages from ref. works you
have, but just citing the works doesn't cut it here. You can easily
misunderstand what you read, so you need to quote some stuff from your
books as support for your arguments. I can give you all kinds of refs
that you have no access to and you would be a fool to believe me.
>
> In fact, some studies, http://mystic.math.neu.edu/gorban/Gorlov2001.pdf
> (note this pdf looks at axial as well as cross−flow turbines) suggest that
> curvilinear flow in free−flow turbines is much lower than Betz. Power
> extraction levels as low as 30% may be the limit when the flow changes
> direction more than once through the rotor (as it might in your S−rotor).
>
"Suggest?" "Might?" That's the best you got?
>
> Look closely through the text of
> http://www.windpower.org/en/stat/betzpro.htm and you'll see there is no
> mention of the geometry, number or shape of blades, nor the orientation of
> the axis of rotation. Look past the 'pretty picture' that shows a
> conventional, three−bladed, axial−flow turbine and study the text and
> equations. No mention of tip speed, 'bluff' or 'airfoil' actions. Just the
> basics of free−flowing fluid entering and leaving a 'wind turbine' (and like
> it or not, your S−rotor is a 'wind turbine').
>
You forget to say that it refers only to "swept area" in the "basics"
of free−flowing fluid behavior and that the only valid application of
"swept area" is the area swept by the blades of lift−type rotors,
wings, and sails.
>
> In http://www.windpower.org/en/tour/wres/betz.htm, the first paragraph under
> the subsection titled "Betz' law", we find, "Betz' law says that you can
> only convert less than 16/27 (or 59%) of the kinetic energy in the wind to
> mechanical energy using a wind turbine. "
>
> Now, to head off your argument that your S−rotor isn't a 'wind turbine', try
> http://en.wikipedia.org/wiki/Wind_turbine. The first sentence: "A 'wind
> turbine' is a machine for converting the kinetic energy in wind into
> mechanical energy." Further down it describes various types, including
> under "Vertical axis", the Savonius wind turbine. In
> http://www.m−w.com/dictionary/turbine, a 'turbine' is defined as "a rotary
> engine actuated by the reaction or impulse or both of a current of fluid (as
> water, steam, or air) subject to pressure and usually made with a series of
> curved vanes on a central rotating spindle" Certainly these definitions
> apply to your device.
>
> That enough references for you??
>
Yes, plenty. So if my device extracts more than 59% of the energy in a
60 mph slipstream, does that mean that Windpower.org is wrong, or that
Wiki−Piki and m−w.com are in error? And why is it that the two sources
do not have the same explanation for a wind turbine? The reason is
because there are more than one or two definitions of a wind turbine.

One simply defines it as a machine, the other as a rotary engine. The
S−rotor does not have "a series of curved vanes on a central rotating
spindle. In copping−out, Wiki−wiki makes the term even more ambiguous.
Their definitions are not wrong − they're just not detailed enough to
describe many types of turbines, esp. the drag−types, well enough to
distinguish the differences between them.
> >>
> >> You don't seem to really understand the derivation of the
> >> Betz limit. It is *not* a function of airfoil, or 'bluff blades', or
> >> 'swept
> >> area' or whatever. It is derived from the conservation of
> >> mass/energy/momentum in a slipstream where the pressure/elevation/density
> >> some distance upstream of the device in question and
> >> pressure/elevation/density some distance downstream of the device are the
> >> same. Doesn't have to be right *at* the device, just some place
> >> upstream/downstream.
> >>
> > A function is a variable quantity whose value depends upon those of
> > other quantities. One of the variable quantities depended upon by the
> > Betz equations is the area swept by the blades of a lift−type rotor.
>
> Not of just a 'lift−type rotor'. It also applies to the 'swept area' of a
> Savonious rotor, or any other turbine. You're limiting the application
> based on your personal interpretation of 'swept area'.
>
No, you cannot. The swept area of an S−rotor is not a factor in its
design. It is a critical factor in the design of a lift−type rotor,
however.
>
> > The Betz limit is a derivative of the function of available energy
> > passing through an area swept by airfoiled blades.
>
> Not just airfoiled blades. *Any* blades. The cross−sectional area of your
> device interacting with the wind is the 'swept area', and the same
> calculations apply.
>
>
Not so. The area interacting with the wind in an S−rotor s not the
disk area swept through by the rotor blades.
>
> > The blades can only
> > use a certain amount of energy from all of the wind passing through the
> > swept area because some of it passes through unused. The only way for
> > the total energy in the wind to be harnessed is explained by the 3rd
> > law of motion which explains the conservation of momentum when objects
> > collide.
> >
>
> No, the 'total energy in the wind' can not be harnessed at all. That's what
> Betz was saying.
>

Yes, we know he was talking about lift−type rotor limitations because
his equations must include the area swept by a lift−type's rotor
blades.
>
If you harness all of the energy from a packet of air,
> then the air leaves the device with a velocity of zero. In other words, the
> first 'packet' never leaves the device. If it never leaves, no other
> 'packet' ever enters, and power production is zero. So to produce power, it
> must leave with a velocity greater than zero.
>
Oh, it leaves, alright, either by being pushed out by the incoming wind
or being sucked out by the low−pressure area created behind the exit
area.
>
> Just as in your device, if you extract all the energy from one packet, it
> leaves with speed of zero (i.e. it never leaves). Since you have to have
> another packet enter the device, the first one must leave (duh...). But in
> order to leave, it must have some velocity. Some velocity means some
> kinetic energy. Leaving with some kinetic energy means that 'the total
> energy in the wind' is *not* extracted. QED.
>
No it doesn't. It is given new energy from the incoming wind. That's
enough of this nonsense. Even if no air were to escape through the
rotor except by extraction, there will always be some losses so that
100% can never be extracted.
>
> You can argue if it is 'pushed' by the next packet, but then the packet that
> did the 'pushing' now has slowed and has less energy. Either way, the
> amount of power produced by the device is limited to less than 'the total
> energy of the wind.'
>
> >> >>
> >> >> If you look at the fluid flow in/out
> >> >> of *any* device with the same pressure/elevation/density between the
> >> >> inlet
> >> >> and outlet, the power calculations still yield no better than the Betz
> >> >> limit.
> >> >>
> >> > So how do you figure that about my device?
> >>
> >> Because the Betz limit applies to *any* device in a fluid stream with
> >> inlet
> >> pressure/elevation/density are the same as outlet
> >> pressure/elevation/density.
> >>
> > So what you're saying is that the Betz limit applies to any device
> > because the power calculation still yield no better than the Betz
> > limit. See any circular logic in that?
>
> Your statement certainly is circular, but since that is *not* what I'm
> saying, I don't have a problem. The Betz limit applies to any turbine

> extracting energy from a 'free−flowing fluid'. That is a fluid where the
> pressure/density/elevation at some point upstream of the device is the same
> as downstream. Where you came up with your circular logic, only you know.
>
I read it just up a few paragraphs: "the power calculations still yield
no better than the Betz limit." "Because the Betz limit applies to
any device in a fluid stream with inlet
pressure/elevation/density are the same as outlet
pressure/elevation/density." See your little circle now?
> >>
> >> I don't have to know anything about the
> >> internal workings of the device to know that extracting more energy from
> >> each pound of air will slow down the flow rate of the fluid resulting in
> >> a
> >> power drop, or that allowing the fluid to flow through the device faster
> >> means less energy is extracted from each pound of fluid and the power
> >> will
> >> again drop.
> >>
> >> >>
> >> >> You can only get above 59% power extraction if you have a difference
> >> >> in pressure/elevation/density between inlet/outlet.
> >> >>
> >> > Okay, let's take the inlet of an airfoiled wind propeller as its swept
> >> > area and its outlet as the area behind the blades. The
> >> > behind−the−blades area has a lower pressure as the result of having
> >> > passed by the blades. By your argument, the Betz limit doesn't exist!
> >>
> >> Nope. One simply draws the 'system' surface somewhat upstream of the
> >> device, and downstream of the device some distance to where the
> >> pressure/elevation/density are the same again. The inlet area is
> >> actually
> >> smaller than the outlet (has to be for the mass flow rate to be
> >> 'conserved'). As the air moves from my invisible 'inlet' face towards
> >> the
> >> device, the flow area widens and the pressure rises. After it passes
> >> through the device, the pressure drops (the dp across the device does
> >> work).
> >> As the flow continues on past the device, the flow area widens some more,
> >> and the pressure rises back to atmospheric at the invisible 'outlet'
> >> face.
> >>
> >> When the system includes the space in front of, and behind the device
> >> extending out to the invisible 'faces', the pressure/elevation/density at
> >> the inlet and outlet faces are equal, Betz applies.
> >>
> > No, all that's technobabble related to something other than the Betz
> > limit.
>
> Shame you don't understand.
>

Oh I understand technobabble when I see it.
>
SNIP >> >>
> >> > Betz wrote it wrt airfoiled propellers and their relationship to the
> >> > slipstream area through which they sweep. If he had been asked if it
> >> > applied to drag−type rotors I'm sure he would have answered no.
> >>
> >> Have you any evidence for this article of faith? The Betz limit applies
> >> to
> >> all 'turbo−machinery' which includes S−rotors, Savanious (sp), paddle
> >> wheels, and axial flow wind turbines.
> >>
> > Sure, the reference to "swept area" is what assigns it specifically to
> > rotors having a swept area, which can only refer to a rotor having
> > airfoiled blades spaced apart through which the wind passes where the
> > blades are set at angles to the wind and not perpendicular to it.
>
> Oh boy... You're placing a *huge* amount of faith in your interpretation of
> 'swept area'. And your interpretation is wrong. 'Swept area' is not
> limited to only axial flow 'airfoiled blades'.
>
I didn't say it is. I said that Betz was referring specifically to
wind rotors.
>
> It is the total area the
> blades of any rotor pass through, viewed from the direction of the wind. In
> a Savonus rotor if neither side is shielded, it is the diameter of the rotor
> times the height (the viewed from the windward side, it presents a
> rectangle). On your 4' by 8" design, it is simply 2.667 ft^2.
>
Yes, if you're talking about the area swept by the blades of an
S−rotor, but Betz referred specifically to the area swept by airfoiled
rotors in his equations. His equations cannot be valid applied to an
S−rotor.
> >>
> >> The head I'm talking about is the elevation of the fluid, not the parts
> >> of
> >> the device.
> >>
> > For the paddlewheel, the elevation of the fluid changes as it moves up
> > and down through the water as it rotates. A paddlewheel will have some
> > paddles submerged part of the time as it turns. The head for the
> > paddlewheel constantly varies up and down.
>
> No, the *water* in an undershot paddle wheel such as used on old−fashioned
> Mississippi steam boats, ideally does not rise up out of the river.
>
That's not what I said. The paddle goes down into the water inch by
inch deeper and deeper until it begins to come up and then it goes up
into the water above it the same way. As it turns on its axis, it can
only move in that fashion.

>
> Ideally, it would slide off the paddle blade smoothly as the blade rises out
> of the water. The fact that some paddles dip into the water while others
> rise high out of the water is *not* a change in the elevation of the fluid.
>
Yes it is, as far as the blade is concerned.
>
> The water you see rising up from the back of the wheel and then splashing
> back down into the river is an energy loss. That water's potential energy
> as it is lifted up is wasted in falling back to the river doing nothing to
> propel the steamboat. Such paddle wheels are woefully inefficient. That's
> why they aren't used on modern ships.
>
> If by 'paddlewheel' you mean an overshot water wheel as seen by old mills on
> a mountain stream, the water certainly does go from one elevation to another
> as it passes from the upper chute, through the wheel to the stream below.
> So Betz doesn't apply to that device.
>
> >> >>
> >> >>
> >> > Wrong again. The air exiting the device has lost some of its energy in
> >> > turning rotor, thus it has lower pressure coming out than it had going
> >> > in, so the Betz limit does not apply to it, by your own words.
> >>
> >> Nope.
> >>
> > Yep.
>
> Is the pressure 50 feet downwind the same as the pressure 50 feet upwind?
> Yes. So there has been no permanent, net pressure change in the fluid.
>
Oh, did you imagine I said "permanent"?
>
> Nor
> has there been a permanent net elevation change. If the temperature of the
> air hasn't changed, and the pressure is the same, there has been no
> permanent, net density difference. It is a free−flowing fluid, Betz
> applies.
>
No, it doesn't.
> >>
> >> Yes, the air exiting the device has lost some energy, but that doesn't
> >> mean
> >> it remains at some lower pressure forever.
> >>
Oh, did you imagine I said "forever"?
>
> > Now you're adding on to your qualifications as to what your
> > understanding of the Betz equations are all about. You can go on
> > forever that way, apparently, but it's still as illogical the farther
> > you go as it is at the beginning.

> >>
> >>If it were at lower pressure,
> >> how does it 'leave' the area behind the device?
> >> Answer: It's remaining
> >> kinetic energy is partially converted to pressure as it slows flowing
> >> through a wider and wider flow field. Once the pressure in this air is
> >> equal to that of the downwind pressure of the flow stream, then it can
> >> flow
> >> away from the area behind the device, making room for more air to flow
> >> through the device.
> >>
> > That's totally silly. The correct answer is that it is pushed out by
> > the incoming wind.
>
> Ah, so now it has a velocity when it leaves, doesn't it? And some of the
> energy of the next 'packet' of air goes towards pushing the first 'packet'
> out of the way, doesn't it??????
>
> If the incoming wind expends energy pushing some other air out of the way,
> then it isn't available for your device to extract now, is it?
>
> Think on that for a bit.
>
Why? I don't disagree.
> >>
> >> This is why it is important that the air leaving the
> >> device still have some kinetic energy, so it can be converted to pressure
> >> and restore the air pressure to the same level as the surroundings.
> >>
> > You know, all that would be hilarious if I did not think you were being
> > serious.
> >>
> >> And
> >> leaving some kinetic energy in the air means you're not getting all the
> >> power out of the wind, hence the Betz limit.
> >>
> > But then the Betz limit does not apply when you get all the power out
> > of the wind or water by using a paddlewheel or an S−rotor where the
> > momentum of all the wind or water pushes against the blades.
>
> Yet the 'incoming wind' pushes it out? So when it leaves, it has a velocity
> other than zero. And some of the incoming wind's energy goes towards
> pushing it out of the way, so cannot be extracted by the rotor???
>
> You're trying to extract all the energy, but still have it 'move out of the
> way'. Can't have it both ways.
>
No. I'm just trying to extract more than the Betz limit.
> >>
> > > The energy it lost was kinetic energy, so that means it is moving
> > slower.

> >> And if it's moving slower, for mass flow rate to be conserved, the flow
> >> area
> >> must widen.
> >>
> > But the mass flow rate is already slowed, and I see no reason why it
> > must be conserved.
>
> Because if more mass flows in, than what flows out, it has to be accounted
> for. Where does it 'pile up'?? If it doesn't accumulate (which of course
> it doesn't), then it must be leaving at the same mass flow rate as it enters
> (i.e. mass flow rate is conserved).
>
> But if the density is the same, and the velocity is lower, the flow area
> must be wider. The 'pretty picture' of a wind turbine shows a sort of
> expanding tube with the turbine in the middle. The flow field starts out
> narrow, and expands as it passes throught the turbine. As it slows down, it
> must widen to keep the same m^3/s flow in as there is m^3/s flow out. The
> tube merely shows the outer rim of this flow field.
>
> >>
> >> Looking at imaginary flowlines through/past the device, they
> >> diverge away from each other behind the device as the slower air needs a
> >> wider area to carry away the same mass as that which flowed into the
> >> device.
> >>
> > But the slower air is the same mass that flowed into the device, it is
> > only its energy that has changed and that's why it has slowed.
>
> Flow in must equal flow out. If density is constant and velocity varies,
> then flow area must vary inversely. Conservation of mass in a flowing
> system. That is why I said the flowlines diverge away from each other
> behind the device. Just like the 'tube' drawn on the 'pretty picture'.
>
> > Seems
> > to me like you're making up your own physics here like you claim I'm
> > doing. You have different ideas about a number of things but most of
> > them appear to be wrong ideas.
>
> Too bad 'my ideas' are published in almost every college text on
> thermodynamics that discusses turbo−machinery. Yours seem to be based on
> solely on your interpretation of what kind of devices have a 'swept area'.
>
No, they're not, you just imagine they are.

.

- ***References***:
  - ***Mobile S−Rotor!***
    - ◊ *From:* TomGee

- ♦ ***Re: Mobile S−Rotor!***
  - ◊ *From:* liberti
- ♦ ***Re: Mobile S−Rotor!***
  - ◊ *From:* TomGee
- ♦ ***Re: Mobile S−Rotor!***
  - ◊ *From:* K. Jones
- ♦ ***Re: Mobile S−Rotor!***
  - ◊ *From:* Chris Torek
- ♦ ***Re: Mobile S−Rotor!***
  - ◊ *From:* TomGee
- ♦ ***Re: Mobile S−Rotor!***
  - ◊ *From:* daestrom
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- Index(es):
  - ♦ ***Date***
  - ♦ ***Thread***