Kamov
Ka-50 Hokum


Pacman@cix.compulink.co.uk

Contribution:
Paul Nann, (http://www.cix.co.uk/~panic)
The War Toys Site, (http://www.wartoys.com)

User Contributed Notes Database Main Index

michael (houston texas usa)
the ka-50 is a twin-turbine combat helicopter which is fairly similar to the ah-64 apache. the hokum differs in that it has co-axial rotors. the pilots are arranged in a tandem layout.

felix dzerzhinski (riverside ca usa)
the KA-50 is a single pilot helicopter

gordon huie (dallas tx usa)
The hokum has probably only seen action in the caucases.. Chechnya probably. The lack of a tail rotor is interesting ALso maybe faster than apache or longbow

david edwards (widnes cheshire united kingdom (england))
I am interested to know a few more aspects of the flights dynamics of this machine. First of all, two contra-rotating rotor sets would surely produce a helicopter without dissymetry of lift? The DOL of one rotor set would be cancelled by the lift from the other, and vice versa. Which would mean in turn that it did not have a conventional Never-Exceed Speed? Or am I missing something here? Also, how is the Hokum steered? Does it use the engine exhausts for this? If so, I presume there is a mechanism for delivering differential gas flow to one side of the helicopter to enable it to turn. Only I gather this machine possesses some unique capabilities because of this rotor configuration. For one, it\'s claimed to be fully aerobatic, including the ability to loop! Although I suspect this is not a manouevre to be performed with a full weapon load ... :) Anyone care to enlighten me about the dynamics of this machine?

murat (istanbul none turkey)
Hi, here are some basic ideas on coaxial and conventional (with tail rotor) helicopters: ---- To rotate the rotors we need to give a torque to them which we create by the engine but; unlike the ground devices, airborne vehicles are not fixed to a base; without an anti-torque idea the fuselage (body) will rotate in the counter direction with the rotor. This can be solved with numerous approaches: conventional (tail rotor or fenestron) & NOTAR systems solves it by adding an anti-torque creating device on the fuselage while tandem, coaxial, intermeshing & ABC (advancing blade concept) solves it by a second lift & thrust generating rotor. ---- In conventional concept about 25% of the engine power is used by the tail rotor which in fact serves only to stabilize the main rotor and creates no lift or thrust. In the latter solutions the two contra rotating rotors naturally balances their torques therefore there is no need for an anti-torque mechanism. With this power advantage many twin rotor helicopters can loop and usually used for heavy cargo applications. ---- Also the tail rotor rotates faster than the main rotor i.e. has a higher tip speed which limits the top speed of the helicopter since the combined speed at the tip can get too high and create important problems. ---- For coaxial helicopters (like K-50) since the two rotors are connected to the body through a single axis, the fuselage is independent of the rotors. The rotors can completely control the movement of the vehicle in space and fuselage is free to rotate about the axis. -- One of the advantages of this free rotation is in army applications: since the body can rotate in any directions without disturbing the cruise, there is no need for the gun to have a movement mechanism. (Which is very complicated, limits the weight/calibre of the canon, power consuming, heavy and needs a sophisticated targeting mechanism like an eyeball tracking system for the pilot) In K-50 a giant

canon is fixed to the body and pilot can rotate any direction for targeting. With this approach the K-50 can be controlled by a single pilot which makes it unique in its class. Also K-50 proved to have the highest hit ratio in targeting tests. The K-50 can shoot backwards while cruise and make 180deg manoeuvre in seconds and change direction in top speeds. (Videos of these manoeuvres can be found in internet) ---- Another advantage of the coaxial system is that the lower rotor gets the induced stream from the top one which increases its efficiency 10%. So on the overall efficiency a coaxial rotor gives 40% more lift/thrust than a conventional one with the same engine power, with which the K-50 is 50km/hr faster than its closest competitor. (270-320) ---- Sorry for the long text hope you'll find it useful :)

murat (istanbul none turkey)
Sorry, even though it was a long text I forgot to add the DOL part. The two rotors cancel each others dissimilarity since on each side one rotor is leading the other is lagging but the top speed is not just the function of the DOL. DOL does not have much effect on the limiting speed. It is more of a function of the rotor tip speed. In general rotor tips we don\'t want to exceed ~.7 Mach which is the noise rise Mach for a standard tip. In military helicopters they go up to transonic speeds but it is not a good operational condition. There is also a BIV (blade vortex interaction) phenomena; which occurs if one blade travels in the wake of the other. This is also important in top speed. Both concepts apply to coaxial helicopters also so K-50 does not have an advantage in these just being coaxial. For the limiting speed the blade tip design is the key concept which is a very popular subject in helicopter aerodynamics researches.

redarmy (novosibirsk novosibirsk russia)
You people are missing one important point here: the Ka-50 \'Black Shark\' (chernaia akula) is the single seat \'variant\' and has the NATO designation Hokum-A. This chopper lost out to the Mil Mi-28 Havoc in competition, essentially the descendant of the Mi-24. The two seat \'variant\' you\'re talking about is actually the Ka-52 \'Alligator,\' which is a derivative of the Ka-50. This has the NATO designation Hokum-B.

daniel (miami fl usa)
I have recently been learning a ton about coaxial helis. It is a very interesting subject. First of all, in a conventional helicopter with a tail rotor, the things that limit how fast it goes is drag, forward thrust, retreating blade stall, and the advancing tip going supersonic. I don\'t think the tailrotor tip going supersonic was the real bottleneck. Since a coaxial setup has 2 rotors and each advancing blade is on the opposite side. You no longer have the assymetric retreating blade stall problem. Your retreating blades do still stall but they are on both sides, and you also have 2 sets of advancing blades on each side to prevent the rollover from occuring. Also since your now producing lift with 2 rotors instead of 1 you can reduce the diameter of the rotors. This also means that at the same rpm you have lower tip speeds which now means that your drag/thrust is now your bottleneck for higher top speeds. The rotor mechanics for most coaxials is pretty simple. You have a standard swashplate under the lower rotor which works just like a conventional helicopter. The difference is that there is also a 2nd upper swashplate that is linked to the lower swashplate, which sits between both rotors. This is so that you get uniform collective and cyclic control on both sets of rotors. The tricky engineering feat is getting the directional (yaw) control. In a coaxial helicopter, directional (yaw) control is achieved by differential torque. Increasing Torque on one rotor and decreasing on the other. This can be done 2 ways. By differential power or differential collective. Most modern coaxials work with differential collective. This is when you have to get creative and work with mechanical mixers to get the rotors to have differential collective with pedal input while still having the uniform collective with the collective stick input. Just a note. You are able to maintain altitude using the differential torque method because your increase lift on 1 rotor but decrease lift on the other

rotor. Therefore your net lift is the same