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[Undulating Skin May Reduce Drag on Airplanes](#)

Engineers create material imitating the properties of dolphin skin

Chaotic fluid movements in gases and liquids often increase the friction and drag on vehicles such as aircrafts and submarines, but this could easily change by creating a skin imitating that of dolphins, which has the ability to modify its shape and decrease drag coefficient by up to 50 percent. Such a material covering the surface of an aircraft or a submarine would basically adapt in order to calm the chaotic movement of the fluid, by decreasing its interaction with the gas or liquid. "The particles in the fluid stop 'speaking' to the craft's surface," says Texas A&M University researcher, Dimitris Lagoudas. He and his colleagues have been working to create a surface skin which wrinkles in such a way that it would determine an ideally ordered surface fluid flow in relation to the speed at which the craft is traveling. "Dolphins induce their skin to wrinkle, so water won't stick to them," said Lagoudas. Although intuition tells us that smooth surfaces should produce less drag than a wrinkled one, mathematical models have shown that this intuitive thinking is in fact wrong. The active skin developed at the Texas A&M University wrinkles to the shape of an ideal surface wave. It does so with the help of piezoceramic actuators located right under the skin, and activated through an electric field. Skin deformation can reach a maximum height of 30 micrometers. "We measured flow velocities very close to the skin and derived the skin friction drag - we have seen reductions as much as 50 percent," says Othon Rediniotis. "It would be feasible to use this on aircrafts, but more challenging. The velocities are higher and so the traveling waves must be higher in frequency," explains Lagoudas. "It's a novel technique that has been demonstrated to work under lab conditions. But implementing this in something the size of an aircraft would be pretty daunting," said Imperial College London researcher, Jonathan Morrison. Researchers worry that such shape-shifting skin would be too complex in design for both aircraft and submarine use, since the consequences of it failing during operation cannot be determined yet. Nonetheless, they argue that a skin with a fixed deformation could also be of great use, especially for crafts that travel at fixed speeds, such as airplanes. However, although extremely useful under cruise conditions, static skin may cause some problems in different conditions. "When you're coming to land, you actually want the drag," concludes Lagoudas.