

Rapid dispersal of aircraft pollution

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A series of aerofoil-shaped panels downwind of an airport runway could break up the plumes of exhaust gases from departing aircraft, preventing those gases from staying near the ground and so dispersing them more quickly. A similar array could be used to prevent vehicle pollutants accumulating downwind of motorways, or even to disperse ground frosts over arable fields.

Michael Bennett of the Centre for Aviation, Transport and the Environment, at Manchester Metropolitan University, writing in the *International Journal of Environment and Pollution*, describes a computer model that he has used to simulate [pollution](#) from aircraft, and shows how the exhaust gases might be more quickly dispersed by the placing of an array of aerofoil-shaped panels downwind of aircraft in their take-off run. He has used the computer model to simulate how effectively such an array might reduce ground level pollution near London's Heathrow Airport.

The exhaust gases emitted by an aircraft beginning its run up to take-off are produced in huge volumes close to the ground. Initially, these gases are slow to disperse upwards, both because of the aerodynamics of the moving aircraft and because of the so-called "Coanda effect", which makes a jet of air cling to a surface. At the distance of the boundary fence, surface concentrations of pollutants may thus still be undesirably high. Bennett models how the line of panels encourages this pollution to leave the ground by creating a swarm of vortices downwind. These rise through their mutual interactions, carrying the pollution with them. This is the reverse process to the aerofoil wing effect that allows an aircraft to

take off, but instead of lifting an aircraft by pushing the air down these ground-based aerofoil panels use the ambient wind to push the exhaust gases upwards.

The aerofoil panels would be tilted to accommodate the prevailing wind and sited on the ground at such a distance and height that they would not cause problems for aircraft taking off or landing on the nearby runway. The basic aerofoil panel array modelled by Bennett could then reduce surface pollution from aircraft exhausts at the airfield boundary by at least 25 percent, he suggests. An equivalent reduction in pollution emissions from the [aircraft](#) fleet might take decades.

The next step will be to carry out [wind tunnel experiments](#) to see whether the pollutant-dispersing aerofoil panels will work in practice. Substantial engineering and regulatory work would then be required before any such system could even be tested at a working airport – in aviation, safety is paramount!

More information: Bennett, M. (2015) 'The application of an aerofoil array to enhance the dispersion of an extended surface-based pollution source', *Int. J. Environment and Pollution*, Vol. 57, Nos. 3/4, pp.202–214.

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