
This project will put your knowledge of electromagnetism into practice, researching new methods of inducing high frequency currents into metal components to test them for tiny surface defects and cracks - beyond the limits of what is currently viable. It is an Applied Physics project that is of high interest to industry, which is reflected in the fact that it is an iCASE award, carrying an additional bursary payment when compared to the normal PhD stipend. In addition to presenting papers in the leading academic conferences and journals in this area, we will have regular meetings with industrial partners from sectors such as the aerospace industry, giving the successful student valuable experience of both University and Industrial research environments, broadening your experience and strengthening your CV.

We have developed some new instrumentation that is capable of inducing currents (eddy currents) in the surface of a metal sample such as titanium, at frequencies over 15MHz - far beyond what is available at the moment. We do this using specially designed coils that are positioned close to the sample, but do not touch the sample, and then using the magnetic field arising from these currents to determine if there are changes in the electromagnetic properties of the sample, that could be caused by material degradation or small cracks. The presence of even the smallest cracks on components such as jet engine turbine blades could be catastrophic due to the high stresses and temperatures that these components can be exposed to. This project will provide you with the chance to apply and develop your knowledge of the underlying physics to a real world problem, working on equipment and analysis that will improve safety and produce some novel new measurement techniques. The project will work closely with academic and industrial members of the EPSRC funded Research Centre for NDE and particularly closely with Rolls Royce, with whom we will start a 4 year Royal Society research project with in Autumn 2016.

You will be based in the Ultrasonic Group in the Physics Department at the University of Warwick (https://www2.warwick.ac.uk/fac/sci/physics/research/ultra/), which has an excellent record in developing innovative research and translating it into practical technology. Candidates should hold or expect to hold a 1st (or high 2.1) in Physics, Engineering or related subject area. For more information, please contact Professor Steve Dixon (s.m.dixon@warwick.ac.uk).