

# Postbuckling of cylindrical composite structures with geometric imperfections

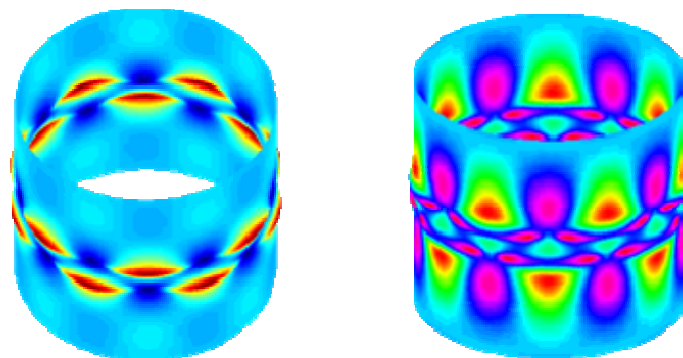
*Supervisor: Prof Brian G. Falzon*

## Background

Curved, thin-walled shell structures are extensively used in weight-critical applications. Constructing these from advanced carbon-fibre composite material offers the possibility of creating very lightweight structures which are particularly suited to aerospace structures. It is well established that the behaviour of thin-walled cylinders under compressive loading is highly sensitive to initial imperfections. To account for this, most design codes incorporate a 'knock-down' factor. This tends to be conservative and limits the full weight-saving potential that composite shell structure can offer.

## Proposed Research

In this work the relationship between axial/circumferential stiffness and initial imperfections (distributed and localised) will be explored through numerical analysis and validated by an experimental programme. A selection of shells will be manufactured and their initial imperfections measured and incorporated in the finite element models. Once a validated numerical tool is developed, it will be used to explore reinforcement schemes to optimise the buckling and postbuckling response of thin-skinned cylindrical structures.



Buckling mode shapes for cylinder.

Composite structures are highly susceptible to delamination, particularly when subjected to impact loading. The effects of localised damage on the response of these structures will also be investigated.