

## AN INVESTIGATION OF THE VARIATION OF CONTACT AREA WITH INFLATION PRESSURE

**P. Millar \***

Lecturer, University of Ulster, (UK)

**D. Woodward**

Reader, University of Ulster, (UK)

**S. Friel**

PhD student, University of Ulster, (UK)

**A. Woodside**

Professor, University of Ulster, (UK)

\* University of Ulster, School of the Built Environment, Shore Road, Newtownabbey, County Antrim, Northern Ireland, p.millar@ulster.ac.uk

### *ABSTRACT*

This paper investigates the relationship between contact area phenomena and tyre inflation pressure. It aims to show that the engineering performance of a highway surface is not related merely to contact area but also to how contact pressure is distributed within this area. The assumption of an elliptical contact patch is simplistic. The examples shown in this paper illustrate that a surfacing material may be exposed to much greater stressing than previously assumed. This may lead to significant impairment of its performance with medium to long term implications for maintenance and repair. An introductory background to the modelling of interfacial contact patch stress is given. Two examples of how contact patch data can be measured are given. Both procedures use XSensor™ pressure mapping technology. The first deals with dynamic measurement of asphalt surfaces. The second example considers a simple static load on an ideal smooth surface to assess the effect of increasing tyre inflation pressure. Both examples show significant divergence from the assumed ellipsoid contact patch shape and uniform stressing distribution.

*KEY WORDS:* Interfacial stress, pressure mapping, contact area.