
Preface

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Measuring, characterising, specifying and synthesising the expected terrain topology are crucial tasks for ground vehicle design and testing. Understanding the elevation profile of the terrain and how the vehicle interacts with the elevation profile and soil is crucial to understanding vehicle dynamics, loads, ride comfort and vehicle reliability. Vehicle stability and control are also dependent on the terrain topology, and manned and unmanned ground vehicle programmes succeed or fail based on the terrain topology assumptions. For simplicity and convenience, vehicle design programmes in the past defined the terrain as a single measure, such as the root mean square of elevation (RSME) or the power spectral density, but these definitions of a terrain's topology assume it is linear, stationary and Gaussian. Various authors have demonstrated that in most terrain topologies these assumptions are violated. When the assumptions are violated, vehicle designs suffer by having either poor reliability or poor performance under test. Over the last ten years, many new approaches have been found that define terrain topologies without violating assumptions that lead to improperly predicting key vehicle performance and reliability measures. This special issue of the *Int. J. Vehicle Systems Modelling and Testing* focuses on the issue of terrain topology and some of the new approaches available to characterise and model it for ground vehicle applications.