

Infrared thermography of the tensile behaviour of natural gut string

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The paper aims to illustrate three advantages of infrared thermography as a nondestructive, noncontact and in real time technique (a) to detect the occurrence of intrinsic dissipation localization; (b) to observe the progressive damage processes and mechanisms of gut failure, and to determine the optimal tensions for each type of tennis strings. Experimental results evidence a limit of acceptable damage beyond which string will fail due to coalescence of defects and/or weakness zones.

3D modelling of wind conditions for a full-size tennis court

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The harsh effects of Victorian hot summer winds on the court surface and while playing are well known to the thousands of Australian tennis enthusiasts and officials. Red porous surfaced tennis courts have been developed and improved over the years. Owing to the materials used and the construction, these tennis courts are highly susceptible to damage in extreme weather conditions. The author initiated a study to analyse the effects of the use of different windbreak constructions around the tennis courts. The aim of the study was to develop a picture of the wind effects on tennis court surfaces and to develop a computer model to simulate the environment required to replicate conditions of a full-size tennis court. This paper presents settings for both the testing procedure and computer modelling.

Loads distribution along a sail-mast

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This paper presents a study, which concerns the evaluation of sail loads and their distribution along the mast. The purpose of this research is to improve mast design and make efficient its construction methods. The development and application of a methodology for estimating accurately the sail loads configuration achieve the aim. The paper describes the adopted method, supported by a versatile interface tool, elaborated in MATLAB®. Moreover, in order to apply and to confirm the efficiency of the elaborated theory, the study of a FINN class sail-mast configuration is presented.

Accuracy of wind measurements in athletics

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For a 100 m sprint performance to be recognized as a World Record, the performance cannot be achieved with an assisting wind in excess of 2 m s^{-1} . The official wind reading is a 10-s measurement obtained from a single wind gauge placed next to the track. Measurements at Sydney International Athletic Centre showed that the official wind reading does not always provide an accurate representation of the wind actually affecting an athlete as they run down the track. The discrepancy between the official wind reading and the wind experienced by the athlete was about $\pm 0.9 \text{ m s}^{-1}$. This is less than the desired standard of $\pm 0.2 \text{ m s}^{-1}$ required for equitable comparison of 100 m sprint performances.

Specification estimation and analysis of driver swing by the difference in golf club specification

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This paper describes what factors in the golf club specification are effective for golf club development. Significant factors in the golf club specification include frequency, inertia moment, shaft length, and so on. A system used in this paper employs two rate gyros to measure rotation movement of the arm and a release timing of cocking. A rotation movement estimation based on an artificial neural network is proposed. The system facilitates customization of golf clubs to the individual golfer.

The adaptation of golf swing to inertia property of golf club

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Optimal control theory was applied to study the adaptation of the golf swing to the inertia properties of the golf club. A male golfer swinging a standard driving golf club was analysed to determine the initial control torque. Pontryagin's maximum principle was used to find the optimal control torque minimizing the joint torque exertion or joint power expenditure. The change of optimal control torque and resultant swing motion with the change of inertia property of golf club was also observed. The results showed that the optimal control torque minimizing the power expenditure showed good agreement with the actual data, and the effects of the inertia property of the golf club on the regulation of swing motion were clarified.