

# Torsion and the Equine Hoof

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A major concern of the horse-racing industry is eliminating catastrophic failures or breakdowns, and reducing the occurrence of other less dramatic musculoskeletal injuries. Epidemiological studies have identified a number of risk factors for breakdown that show that training environment and history are as important as circumstances during the race. Nevertheless, being able to quantify the instantaneous mechanical causes of catastrophic failure of individual limb bones, tendons and ligaments would go a long way towards devising strategies for preventing breakdowns. In this talk we assess the properties of track surfaces and the interactions of hoof and surface under experimental and near racing conditions using functional data analytic techniques. Such methods have the potential to be incorporated as risk factors in epidemiological analyses and can quantify part of the complex dynamic system comprising the track, the moving mass of the horse, masses of the individual limbs, and the hooves as the interface with the track.