



ID de Contribution: 284

Type: **Contribution orale**

Throwing soft objects with the superpropulsion effect

mercredi 5 juillet 2023 08:30 (30 minutes)

Among primates, humans are the only ones who can throw objects with speed and precision, a skill that was one of the foundations of ancient hunter-gatherer societies. Today, throwing objects is not as essential as it once was, but it remains a source of wonder and performance, especially in sports. It is thus remarkable that it seems more natural and efficient to perform a shot put with a weight of several kilos than with a 50 gram golf ball: if you perform an overarm throw with a light object, you have the frustrated impression that you can not mobilize all your strength and that your arm gets overstretched. In this context, questions arise in terms of physics and mechanics to help understand how to confer a maximum of kinetic energy to launch an object.

If our daily experience suggests the use of an instrument (club, racket, chistera, ...) to throw light objects, we will explore here other solutions inspired by our knowledge of soft materials and the concept of superpropulsion. The idea is to use deformable projectiles that can be designed and tuned to extract the maximum available energy from a thrower, a mechanical actuator or any kind of launcher. Various strategies based on soft elastic objects, composite materials, capillary effects and mechanical instabilities can be developed to optimize energy transfer. We will present experimental and numerical approaches that show that the kinetic energy of a soft object can be multiplied by four compared to that of rigid objects launched under the same conditions. Applications in the fields of sports and biology will be presented.

Affiliation de l'auteur principal

Université Côte d'Azur, CNRS, Institut de Physique de Nice, France

Auteur principal: Prof. RAUFASTE, Christophe (Université Côte d'Azur, CNRS, Institut de Physique de Nice, France)

Co-auteurs: Dr GIOMBINI, Guillaume (Université Côte d'Azur, CNRS, Institut de Physique de Nice, France); Dr CELESTINI, Franck (Université Côte d'Azur, CNRS, Institut de Physique de Nice, France)

Orateur: Prof. RAUFASTE, Christophe (Université Côte d'Azur, CNRS, Institut de Physique de Nice, France)

Classification de Session: Mini-colloques: MC15 Matière molle : des concepts fondamentaux à la fabrication de systèmes originaux

Classification de thématique: MC15 Matière molle : des concepts fondamentaux à la fabrication de systèmes originaux