The Sparkler Rotor

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This research focuses on the question whether sparklers can - when tangentially attached to a rotor - turn it only by their exerted force due to the burning process. To study the phenomenon static sparklers connected to a highly sensitive experimental setup were used. By the use of a forcemeter and through video analysis a small force along the axis of the sparkler could be detected. Consequently experiments with a nearly frictionless setup were conducted with a complete turning sparkler rotor to study the phenomenom further. With this setup it was possible to determine the magnitude of the force in four different ways e.g. by a torsion oscillation. All four measurements lead to a nearly similar result of a few hundred micronewtons. By the use of this knowledge the rotor could be optimized and a differential equation of the movement could be set up. This differential equation could be solved by measuring the tiny magnitude of the coefficient of friction and calculating the moment of inertia. Eventually the theoratically determined behavior of the movement could be verified with the aid of the earlier done measurements. By using this comparison we can identify a maximum of 2 rps with four sparklers.

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