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ANALYSIS AND DESIGN OF MICROROVER DELIVERY SYSTEM

Abstract

Several excellent designs for extremely small, mobile surface elements already exist and are well developed for a range of target bodies. Payloads, range, and overall capability vary considerably, but in general the communications requirement has led to a derived requirement for in-situ communications relay support. This naturally leads to a tethered concept that is then re-used for power supply, thus increasing the lifetime, but reducing the autonomy of microrovers. The best-known example is the Nanokhod rover developed by vHS, a 2kg tracked and tethered system suitable for use in a wide variety of locations.

A major element of the viability of microrovers is missing, which is the delivery and deployment at their target location. This paper examines the requirements (particularly in terms of energy changes) for safely delivering microrovers to a planetary surface and deploying them for their own mission. Scenarios are developed from requirements, covering single and multiple microrovers in a dedicated mission, and also as piggyback elements for other lander/rover concepts. A delivery system design is presented for the multiple microrover scenario, with preliminary top-level budgets