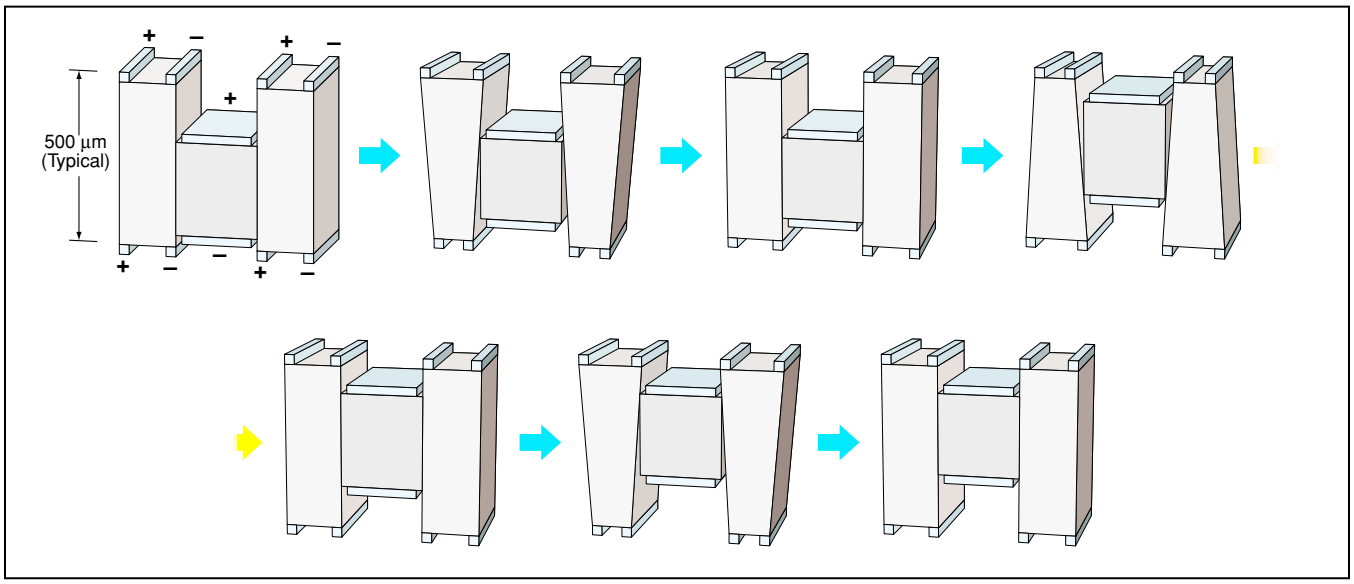

A **Miniature Piezoelectric Inchworm Actuator** fabricated by use of LIGA according to the proposal would have a geometry considerably simpler than that of prior inchworm actuators conventionally assembled from discrete parts.

a mold is made. Among the advantages of LIGA for this purpose are that it is applicable to a broad range of materials, can be used to implement a variety of designs, including those of structures >1 mm high, affords submicron precision, and is amenable to mass production at relatively low unit cost.

Fabrication of the proposed actuators would involve some technological risks — in particular, in the integration of electrode connection lines and placement of actuator elements. It will also be necessary to perform an intensive study of the feasibility of growing piezoelectric crystals onto LIGA molds.

This work was done by Eui-Hyeok Yang of Caltech for **NASA's Jet Propulsion Laboratory**. *Further information is contained in a TSP [see page 1].*
NPO-30429

Books and Reports

Using ERF Devices To Control Deployments of Space Structures

A report proposes devices containing electrorheological fluids (ERFs) damper for controlling deployments of lightweight, flexible structures in outer space. The structures would include spring members that could be wound or compressed for compact stowage during transport. The ERF based damper would keep the structures compacted and/or regulate the speeds with which the structures would spring out for deployment. After deployment, ERF based dampening mechanism could be used to rigidize the structures or damp their vibrations. An experimental ERF deployment controlled structure described in the report comprised two metal carpenter's measuring tapes sandwiched together, held slightly apart by rubber-band spacers, and placed in a bag filled with an ERF. The viscosity of the ERF varied with the voltage applied to the tapes, such that it was possible to hold the tapes in the wound condition or slow the speed with which they sprung from the wound to the straight condition. The report describes several potential variations on the basic concept of an ERF-controlled structural member, including compartmentalization of the interior volume to prevent total loss of the ERF in case of a leak and the use of multiple, individually addressable electrode pairs to enable more localized control.

This work was done by Yoseph Bar-Cohen, Zensheu Chang, Moktar Salama, Xiaoqi Bao, and Stewart Sherrit of Caltech; Christopher Jenkins of SDSM&T; and Aleksandra Vinogradov of Montana State University for **NASA's Jet Propulsion Laboratory**. *To obtain a copy of the report, "Controlled gossamer structures deployment and stability using ERF," see TSP's [page 1].*
NPO-30587