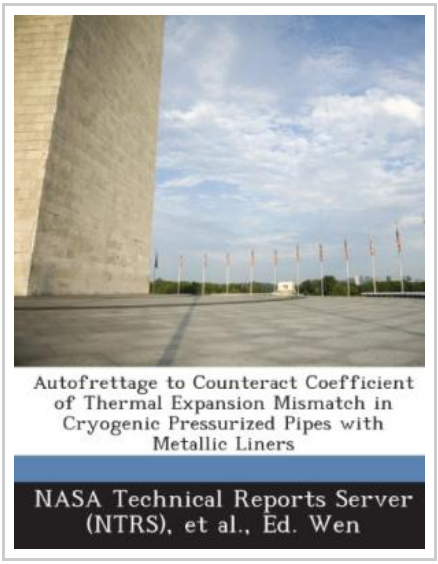

Autofrettage to Counteract Coefficient of Thermal Expansion Mismatch in Cryogenic Pressurized Pipes with Metallic Liners

By Ed Wen

BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 42 pages. Dimensions: 9.7in. x 7.4in. x 0.1in.Composite feedlines with metal liners have the potential to reduce weightcost while providing the same level of permeation resistance and material compatibility of all-metal feedlines carrying cryogenic propellants in spacecraft. The major technical challenges are the large difference in Coefficient of Thermal Expansion between the liner and the composite, and the manufacturing method required to make a very thin liner with the required strength and dimensional tolerance. This study investigates the use of autofrettage (compressive preload) to counteract Coefficient of Thermal Expansion when pre-pressurization procedures cannot be used to solve this problem. Promising materials (aluminum 2219, Inconel 718, nickel, nickel alloy) and manufacturing techniques (chemical milling, electroplating) are evaluated to determine the best liner candidates. Robust, autofrettaged feedlines with a low Coefficient of Thermal Expansion liner (Inconel 718 or nickel alloy) are shown to successfully counteract mismatch at LOX temperature. A new concept, autofrettage by temperature, is introduced for high Coefficient of Thermal Expansion materials (aluminum and pure nickel) where pressure cannot be used to add compressive preload. This item ships from La Vergne,TN. Paperback.

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