

An experimental investigation of the effect of random g-jitter on a liquid-bridge

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Abstract

A liquid bridge consisted of 5 cSt silicone oil suspended between two circular disks was placed on a moving table which produced random g-jitter in all three directions. The g-jitter produced by the table was less than 12 mg simulating the g-jitter in the spacecraft environment. Effect of g-jitter was studied on critical temperature difference for different aspect ratios. It was concluded that g-jitter does not change the critical temperature difference in a half floating zone.

Introduction

Dynamics of liquid bridges has recently attracted a significant amount of interest, mainly due to liquid bridge's extensive use in fabrication of single semiconductor crystals of high purity from the melt by floating zone process. In order to enhance the efficiency and feasibility of the process large bridges with large length to diameter ratios are desired [1]. It is well known that in micro gravity conditions, liquid bridges of cylindrical shape become unstable because of the capillary forces. The resulting thermo capillary flow is always present in the melt when applying the float zone technique for unidirectional semiconductor crystal growth. The undesired thermo capillary flow promotes non-uniformities in crystal striations [2].

The study of the float zone configuration has been simplified by the use of the half zone model. In this configuration a liquid drop is held between two circular cylinders by surface tension forces. Maintaining a temperature difference