

# THESIS ABSTRACTS

This section presents the abstract of most recent PhD thesis related to aerospace technology and management

## STUDY OF SOLIDIFICATION OF EUTECTIC ALLOYS IN MICROGRAVITY ENVIRONMENT

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**KEYWORDS:** Microgravity, Alloys solidification, Eutectic alloys, Heat transfer, Sounding rockets, Drop tube.

**ABSTRACT:** This work aims to study the influence of gravity on the solidification using the technique of conventional and inverse vertical directional solidification (Bridgman-Stockbarger method), the effect of microgravity on solidification in sounding rocket (VSB-30) and the transfer heat by radiation and conduction on droplets obtained by solidification in the Associate Laboratory of Sensors and Materials of Coordination of Spatial Technologies of Brazilian Space Research Institute (LAS/CTE/INPE) 3 m drop tube. To this purpose, it was used the PbSn eutectic alloy  $Pb_{38.1}Sn_{61.9}$  wt. %. The samples were analyzed by densitometry, scanning electron microscopy (SEM) and energy dispersive X-ray (EDS). The results show that the formation of dendritic structures is related to the presence of convective flows, which occur primarily in the solidification in terrestrial gravity, and that there is no dendrite formation in microgravity and the solute distribution profile is constant along the entire sample. A model for heat transfer by conduction is developed for droplets in free fall consistent with the experimental finds, which show that the greater the initial velocity of the droplets the smallest the time of solidification.

## NATIONAL INNOVATION PROJECTS: BRAZILIAN SPACE SECTOR PRACTICES

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**KEYWORDS:** Space industry, Technological development, Cooperation, Public-private partnership, Public contracts, Industrial property, National projects for innovation.

**ABSTRACT:** In markets dominated by government purchases, investment in innovation depends mainly on public subsidies whose success in application is related to a productive arrangement of the institutions involved. In this work, we investigated and analyzed practices and mechanisms associated with innovation in state coordinated projects. The research was carried out using a case study method, having been conducted in two phases: exploratory and field investigating the Brazilian space sector. Institutions and companies participating in the space sector were analyzed. The studied companies develop and manufacture satellite subsystems. In the governmental sphere, official documents related to the space sector and to the national system of innovation were examined. The different elements mapped were laws and regulations, economic subsidy, programs and policies, financial resources, labor, contracts and developed products, and intellectual property. These were studied in light of theories of institutions, national and sector systems of innovation, Sabato's triangle, triple helix, open innovation and public procurement, being characterized as dynamic determinants that contribute to the improvement of the innovation generation process. The results of the present paper include: characterization of organizations which were in the Brazilian space sector and of contracts signed between public institutions and companies; analysis of the legal framework pertaining to innovation, confronting it with organizational practice; and identification of relevant elements in the governance and innovation mechanisms in the space sector. In particular, factors that promote and inhibit innovation were identified in the governance structure of the Brazilian satellite program, based on theoretical presuppositions that condition innovation. In the theoretical field, this work aimed at understanding forms of government, i.e. industry interaction in the context of fostering innovation through structuring an analytical tool for analyzing national projects for innovation. Future applications of this analytical framework may be in studying for other productive sectors, besides high technology areas, which may be dependent of the interaction with the State.