IAF SPACE PROPULSION SYMPOSIUM (C4)
Solid and Hybrid Propulsion (2) (4)

Author: Mrs. Severine Larrieu
ArianeGroup, France

PRESSURE OSCILLATION IN P120C SRM: WHAT HAD TO BE PROVED

Abstract

Since the Ariane 5 development, Pressure Oscillations (PO) in large solid rocket motor (SRM) generated passionate debates. PO is an unpleasant phenomenon of solid propulsion: a functioning instability which occurs sometimes depending on the solid rocket motors configuration and on the operation time interval. It's a phenomenon necessary to master in order to ensure an optimized launcher design and the payload comfort in the launcher. R&D works engaged since the 90's were continuing during several decades in ARIANEGROUP with ESA and CNES agencies support and contributions of ONERA and AVIO partners. Analysis of European launchers unsteady behavior, and works done through dedicated demonstration programs, enabled us to improve our knowledge on this thematic, until the discovery of new phenomenon that can be encountered in future launchers. Beyond progress realized, the maturity level acquired today enabled us to take into account for the first time and as for any other functional characteristic the PO specification in the development of future launchers Ariane 6 & VEGA-C, through their common first stage, the P120C. For the first time in the space community, PO prediction modelling then developed in these last years have proved their efficiency by predicting with precision the unsteady behaviour before the each of the three ground firings test (DM, QM1 and QM2) of this motor; confirming by this way the validity of this approach. This goal of this paper is to present the results obtained on the three static firing tests since, and how the knowledge developed by AGS team on this topic enabled to forecast and explain the different behaviors finally obtained.