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A SYSTEMS ENGINEERING APPROACH FOR SPECIFYING A COMBINED COMPACT PAYLOAD TEST RANGE AND NEAR-FIELD SCANNER FACILITY

Abstract

This paper describes the systems engineering approach used at the Systems Engineering Office (LSIS) to specify the detailed requirements of an integrated compact payload test range (CPTR) and near-field scanner (NFS) facility. The Integration and Test Laboratory (LIT) of the Brazilian National Institute for Space Research (INPE) is currently expanding its facilities due to the evolution of Brazilian space programs, which includes larger, complex, and heavier satellites, such as telecommunication satellites. One of the new test facilities that will be part of the LIT is an integrated CPTR and NFS facility for antenna and satellite payload testing. The systems engineering approach includes systems engineering processes, such as stakeholder needs and requirements definition, system concepts definition, system requirements definition, system analysis, and architecture definition. The approach also describes specific methods and tools that were implemented within each process, such as stakeholder interviews, life cycle analysis, context diagrams, and behavioral diagrams. Additionally, this paper presents a review of several existing compact test range and near-field facilities whose characteristics aided in the elaboration of the specifications. The systems engineering approach that was used enabled the establishment of an optimal solution for the combined CPTR and NFS facility that aligns with Brazilian space program projections.