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Author: Mr. Vladislav Nahorniy
Dragonfly Aerospace Pty (Ltd), Ukraine, vladislavnahorniy@dragonflyaerospace.com

Mr. Dmitriy Utva
Dragonfly Aerospace Pty (Ltd), Ukraine, dmitriyutva@dragonflyaerospace.com
Ms. Liudmyla Lehenkova
Dragonfly Aerospace Pty (Ltd), Ukraine, ludmilalegenkova@dragonflyaerospace.com
Mr. Bryan Dean
Dragonfly Aerospace Pty (Ltd), South Africa, bryan@dragonflyaerospace.com

WIDE SWATH LENS OPTICAL PAYLOAD BASED ON A MODIFIED PETZVAL SYSTEM

Abstract

The emergence of the CubeSat standard has facilitated access to space and enabled missions that would otherwise never have existed. Numerous commercial projects following CubeSat form-factor. CubeSat programmes typically benefit from plentiful low-cost launch opportunities and shorter development cycles. This article describes an optical payload that achieves the wide swath needed to improve monitoring performance.

Monitoring involves the process of systematic or continuous collection of information about environmental parameters to determine trends in their change. The vector of development of agricultural monitoring requires a revision of several days, since different types of crops have different growing seasons. The wide swath allows for coverage of the entire Earth by a constellation of fewer satellites. The developed lens optical payload is a modified Petzval system with a corrected field curvature. This system is designed to solve the problems of agriculture, crops (crop condition), forests, ecology, monitoring, etc. Thanks to the painstaking work of engineers, a synthesis of high spatial resolution 3.5 m from 600 km altitude and an ultra-wide swath of the terrain was achieved 110 km from 600 km altitude. The system lacks central shielding, which indicates a high level of contrast at high spatial frequencies more 0.2 for 91 lp/mm. The payload is designed using composite materials, thus ensuring the rigidity and lightness of the entire system. General mass of developed optical payload is less 8 kg. High spatial and spectral resolution of 10 spectral channels in the visible and near-infrared bands allow solving most of agricultural tasks with one device, which is adaptive for spacecraft and fits into the cubesat 12U form factor can be the most productive space system.