

## 30220 Synthesis in Earth and Space Physics

10 ECTS,

Parallel course activities: 30310 Space Systems Engineering (5 ECTS)

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| <b>Student</b>   | Christian Solgaard (student ID) |
| <b>Supervisor</b>  | Tim Enzlberger Jensen           |
| <b>Industry partner</b>  | None                            |
| <b>Project start</b>   | January 30, 2023                |
| <b>ECTS from concurrently course or project activities</b>   | 5 ECTS                          |
| <b>Project description</b>   |                                 |
| DTU Space is a world leader on airborne gravity surveys for geodetic purposes with major projects all around the world. In recent years, processing strategies have been developed to utilize strapdown Inertial Navigation Systems (INS or IMUs) for gravity surveys. In this aspect, two major processing strategies exist: (1) The direct method and (2) the indirect method. Currently, DTU Space follows the indirect methodology, but the direct method has been shown to lead to similar results [1]. Within this project, the student will work with real airborne GNSS and IMU data and set up a processing methodology according to the direct method. The GNSS and IMU data first needs to be pre-processed using commercial software. After pre-processing, the student will implement small programs that will work in sequence to manipulate the data in order to derive gravity estimates. The developed programs and processing strategy are applied to existing datasets and compared to the current processing strategy in order to evaluate the method. |                                 |

### Learning Objectives

- Describe, design, construct, validate and choose solutions in the form of monitoring, mapping or exploration systems or parts hereof, by combining measurement technologies with an understanding of physical processes and structures
- Complete a larger development project
- Analyse a heterogeneous problem and formulate a precise requirements specification for the task to be solved
- Perform problem, design and implementation oriented analyses and discuss advantages and disadvantages for alternative solutions
- Make a plan for how a task can be solved on time with the available resources
- Explore and analyse relevant technologies for solving the given problem
- Substantiate the choice of technologies on the basis of clearly formulated premises
- Complete a larger development project, including the production of technical documentation that makes clear how major concepts from the problem formulation are traceable in the implementation
- Carry the project through with great independence in all aspects
- Write a well-structured and well-documented report that presents results and analyses in a precise and clear way.

### References:

[1] Johann, Felix; Becker, David; Becker, Matthias; Forsberg, René; Kadir, Majid (2019). The Direct Method in Strapdown Airborne Gravimetry - a Review. zfv Zeitschrift für Geodäsie, Geoinformation und Landmanagement, Jg.144, Nr.

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