

Czech Technical University in Prague
Faculty of Electrical Engineering

Department of Electromagnetic Field

DIPLOMA THESIS ASSIGNMENT

Student: **Bc. Karel Ročejdl**

Study programme: Communications, Multimedia, Electronics
Specialisation: Wireless Communication

Title of Diploma Thesis: **Design of volume clutter detection and parameter estimation algorithm**

Guidelines:

Design an algorithm for detection of volume clutter presence and estimation of radial velocity component (Doppler frequency). Volume clutter may be caused either by rain clouds or by chaff. Designed algorithm must consider variable pulse repetition interval (staggering) and allow efficient implementation in digital signal processor. Discrete angular frequency estimation algorithms implement in MATLAB language and verify correctness by comparison of estimate with parameter of model generating testing signal. Verify the impact of staggering on estimate precision. Scripts for evaluation of performance write in MATLAB language. Provided records of radar signal will be matrixes of complex envelope samples and some other parameters of radar operation in mat-files. For designed algorithms perform an optimization of processed resolution cell size. Choose size maximizing precision (processing of largest batch of signal samples not significantly affected by antenna rotation).

Bibliography/Sources:

- [1] Bezoušek, P., Šedivý, P. Radarová technika, Skripta, ČVUT Praha 2004, ISBN: 80-01-03036-9
- [2] Schleher, D. C., MTI and Pulsed Doppler Radar with MATLAB®, second edition, Artech House 2010, ISBN13: 978-1-59693-414-6
- [3] Richards, M. A., Fundamentals of Radar Signal Processing, McGraw Hill 2005, ISBN: 0071444742
- [4] Nathanson, F. E., Reilly, P., Cohen M. N., Radar Design Principles, Signal Processing and the Environment, SciTech Publishing, Incorporated, 2006, ISBN: 9781891121500
- [5] Řezáčová, D., Novák, P., Kačpar, M., Setvák, M., Fyzika oblaků a srážek, Academia Praha, 2007, ISBN: 978-80-200-1505-1

Diploma Thesis Supervisor: prof. Ing. František Vejražka, CSc.

Valid until SS 2015/2015



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Prague, February 13, 2015