

GEODETIC LINEAR ESTIMATION THEORY – GED507

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Concepts of Observation and the Model

- Observations
- The Mathematical Model

Statistical Concepts

- Probability, Distribution and Density Functions
- Multidimensional Distributions, Marginal and Conditional Distributions, Independence
- Expectations, Moments, and Correlation
- Some often used Distributions
- Multinormal Distribution
- Sampling, Estimation, and Confidence Measures
- Statistical Tests

Error Properties

- Random Errors
- Precision, Accuracy, Cofactors, and Weights
- Blunders
- Systematic Effects (Errors)

Principle and Techniques of Propagation

- Propagation of Distributions
- Propagation of Means
- Propagation of Variances and Covariance
- Propagation of Systematic and “True” Errors

Introduction to Least Squares Adjustment

- The Least Square Principle
- The Techniques of Least Squares
- Linear and Nonlinear Functions in the Model

Adjustment with Conditions Only

- General Case

- Derivations
- Adjustment with Maximum Number of Independent Parameters
- Geometric Interpretation of the Least Square Principle

- Special Cases

- Adjustment of Observations Only
- Adjustment of Indirect Observations

Examples and General Discussion on Adjustment with Conditions Only

- Coordinate Transformations

Least Squares Adjustment with Conditions and Constraints

- General Case for Adjustment with Conditions and Constraints
- Special Cases
- Constraints with Added Parameters

Adjustment with Derived Observations and Adjustment in Steps

- Adjustment with Derived Observations
- Adjustment in Steps

Numerical and Statistical Consideration in Adjustment

- Nonlinearity of the Equations
- Approximate Values for Model Variables
- A posteriori Estimate of the Reference Variance
- Iteration Termination with Linearized Conditions
- A Posteriori Statistical Analysis
- Computational and Numerical Considerations

Problems