Time History Database for Induced Earthquakes

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Outline:

- Regions
- Data sources
- Raw data preparation (SEED files)
- Data processing and data base
- Further data processing for engineering applications



Regions

The prepared ground motion databases are for two regions:



Data Sources

 Incorporated Research Institutions for Seismology (IRIS)

This data center is the main data source for time history database

 Nanometrics FTP site for TransAlta Monitoring Network (TD network) data

This source is used for collecting TD network data

• Earthquakes Canada AutoDRM

This source is rarely used for collecting data from some Nation network stations

• Data hard drive of The Canadian Rockies and Alberta Network (CRANE)



This source will be used soon for incorporating CRANE data into Alberta database













Data Preparation (from Nanometrics FTP)

• The TD data is copied on a local hard drive for easy extraction of event data:





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Data Processing and Database

- Signal processing tool is Qcorrect
- Developed in Fortran
- Calls RDSEED program for reading SEED data files
- It outputs:
 - Acceleration, velocity, and displacement time histories in correct units
 - Response spectra (PSA of 5% damped SDOF system) at 200 frequencies between 0.1Hz 50Hz
 - Metadata (information about earthquake, site, instrument...)

The database tables are developed by tabulating PSAs processed by Qcorrect and corresponding metadata



Data Processing and Database

• Qcorrect main processing stages:



Data Processing and Database

- The database tables carry PSAs (response spectral amplitudes and peak motions) of all records processed by Qcorrect and corresponding metadata
- Alberta database:
 - For the time period of Aug. 23, 2013 to Feb. 2, 2016 records of 2134 events are collected from IRIS, Nanometrics FTP, and Earthquakes Canada AutoDRM
 - The total number of processed channels of data and corresponding PSA table includes 247,670 records
- Oklahoma database:
 - For the time period of Mar. 12, 1990 to Feb. 24, 2016 records of 13,814 events are collected from IRIS





Further Data Processing for Engineering Applications

 Subset of databases' records of engineering interest are selected (M ≥ 3.3 and R ≤ 50km):



Further Data Processing for Engineering Applications (Screenshots of processing stages)





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