

Feature Extraction from Nonlinear Time Series Data

Abstract

Plasma inside the tokamak is highly complex. Various detectors are used to diagnose various plasma parameters such as temperature, radiation, density, impurity etc. However, the times series data from these detectors are not linear. Institute for plasma research owns two indigenous tokamaks, Aditya-U and SST-1. There are almost 300 diagnostics channels being acquired in each plasma discharge operation in Aditya-U tokamak. Analysis of such a huge database manually is not possible. Feature extraction is a crucial step in data analysis that identifies important characteristics of raw data. But before that, effective de-noising is essential for reliable feature extraction. The first step of this project includes the simulation of digital filters in MATLAB to remove unwanted frequency components from raw plasma diagnostic data. MATLAB simulation includes filter design and frequency response analysis. After filtering, the next step of project aims to develop a systematic feature extraction approach that transforms the high dimensional data into a meaningful representation. Key time domain features such as mean, variance, standard deviation etc. will be extracted for characterizing plasma behavior. Final step of this project will be to implement above mentioned algorithms on FPGA based hardware.

Academic Project Requirements:

1) Required No. of student(s) for academic project: 2

2) Name of course with branch/discipline: B.E./B.Tech. Electronics and Instrumentation Engineering

3) Academic Project duration:

(a) Total academic project duration: 20 Weeks

(b) Student's presence at IPR for academic project work: 5 Full working Days per week

Email to: minsha@ipr.res.in [Guide's e-mail address] and
project_ece@ipr.res.in [Academic Project Coordinator's e-mail address]

Phone Number: 079 -07923962124 [Guide's phone number]