# CERTS Project
# Voltage Stability Applications using Synchrophasor Data

## Report 10
## Commercialization

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## Disclaimer

## Introduction

There are two major intellectual properties that have been developed in this project, namely, (1) the AQ-bus method for computing voltage stability margins, and (2) MATLAB code for computing the voltage stability margin for a wind hub.

### AQ-bus method for computing voltage stability margins

The AQ-bus method is a simple but elegant means for computing voltage stability limits without encountering Jacobian matrix singularity at the critical voltage point. It eliminates the singularity by fixing the bus voltage angle at a critical load bus, thus reducing the size of the Jacobian matrix by 1. As such, it is much more efficient than the continuation power flow method.

This method was disclosed as an invention by RPI on March 22, 2013. Subsequently a patent application was filed by RPI on May 2, 2014, with a PCT number of US1437092.

In the interim, RPI has ongoing discussion with a commerical power system simulation software vendor for incorporating the AQ-bus method into its software. Subsequently, the software vendor and RPI had submitted a joint proposal to the BPA Technology Innovation Program to partially fund the code development and test the code on very large power systems. We will know by July 1 whether the BPA project will be funded. Regardless of the success of the BPA funding, the software vendor and RPI will continue the discussion on licensing this IP.

### MATLAB code for computing the voltage stability margin for a wind hub

The MATLAB code is currently being used by BPA for off-line computation of voltage stabilty margins at the Jones Canyon wind hub. This software contains two main components: the AQ-bus method and a Thevenin equivalent voltage and reactance estimation method. The code can be licensed as is. However, we are still working on additional methods for obtaining more consistent Thevenin equivalent voltage and reactance values from measured voltage and current data.