

ห้องสมุดงานวิจัย สำนักงานคณะกรรมการการวิจัยแห่งชาติ



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**ALLOCATING REACTIVE POWER USING ARTIFICIAL NEURAL
NETWORK**

PHETSADACHANH SAYPASERTH

**MASTER OF ENGINEERING
IN ELECTRICAL ENGINEERING**

**THE GRADUATE SCHOOL
CHIANG MAI UNIVERSITY**

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**A THESIS SUBMITTED TO THE GRADUATE SCHOOL IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
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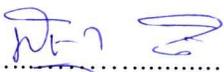
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25 July 2011

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ABSTRACT

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The new electricity markets consider reactive power support as an essential system support service. In order to procure reactive support competitively from the markets, one needs to quantify the value of the various VAR sources available in the system. The qualification and procurement of reactive power support service is becoming an urgent. It is difficult to evaluate reactive support allocations accurately and it is also difficult to compute for reactive power.

This thesis considers two cases which are five-bus sample system and 21-bus system in central I of electricite du Lao (EDL) in Lao PDR system. This thesis will present a procedure for allocating reactive power using artificial neural network with back-propagation algorithm. For five-bus system, input layer has 3 nodes which are reactive power from each load bus, output layer has 6 nodes which are reactive power from each generator to load bus and hidden layer has 20 nodes. For EDL 21-bus system, input layer has 15 nodes which are reactive power from each load bus, output layer has 60 nodes which are reactive power from each generator to load bus and hidden layer has 60 nodes. The proposed artificial neural network can be trained with little difficulty. Once the training data are generated, the accuracy of artificial neural network has been compared with allocating reactive powers by Y-bus matrix method. The simulation results have illustrated that artificial neural network is a good accuracy with simplicity in calculation. The trained artificial neural network can provide solution in good manner.

ชื่อเรื่องวิทยานิพนธ์	การจัดสรรกำลังรีแอกทีฟโดยนำใช้วิธีของโครงข่ายประสาทเทียม
ผู้เขียน	นายเพชรสะดาจัน สายปะเส็ด
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บทคัดย่อ

E 47371

ปัจจุบันการค้ำขายไฟฟ้าในกลุ่มผู้ผลิตรายใหม่ สิ่งที่สำคัญที่สุดที่จะต้องพิจารณาก็คือการจัดสรรกำลังรีแอกทีฟ สำหรับระบบการบริการการจัดสรรกำลังรีแอกทีฟในการค้ำขาย สิ่งที่ต้องการเป็นอันดับแรกคือค่าของกำลังรีแอกทีฟที่มีอยู่ในระบบ โดยเงื่อนไขของการจัดสรรกำลังรีแอกทีฟในการบริการจึงเป็นปัญหาเร่งด่วน แต่อย่างไรก็ตามการคำนวณหาค่ากำลังรีแอกทีฟที่จะจัดสรรได้อย่างถูกต้องนั้นเป็นสิ่งที่ทำได้ยาก

ในวิทยานิพนธ์นี้ประกอบด้วยสองกรณีในการศึกษาคือ ระบบตัวอย่าง 5 บัส และระบบ 21 บัส เขตภาคกลาง 1 ของประเทศลาว สำหรับวิทยานิพนธ์จะได้เสนอวิธีการสำหรับการจัดสรรกำลังรีแอกทีฟโดยนำใช้วิธีโครงข่ายประสาทเทียมอาศัยหลักการแพร่กระจายย้อนกลับค่าผิดพลาด สำหรับระบบ 5 บัสมีอินพุต 3 ตัว ซึ่งเป็นกำลังรีแอกทีฟที่มาจากโหลดบัส และมีเอาต์พุตอยู่ 6 ตัว ซึ่งได้มาจากเครื่องกำเนิดไฟฟ้าที่ส่งให้โหลดบัส และจำนวนชั้นซ่อนมี 20 ชั้น สำหรับระบบ 21 บัส เขตภาคกลาง 1 ของประเทศลาวมีอินพุต 15 ตัว ซึ่งเป็นกำลังรีแอกทีฟที่มาจากโหลดบัส และมีเอาต์พุต 60 ตัว ซึ่งได้มาจากเครื่องกำเนิดไฟฟ้าที่ส่งให้โหลดบัสจำนวนชั้นซ่อนมี 60 ชั้นขั้นตอนการป้อนข้อมูลที่ใช้สำหรับการเรียนรู้ของโครงข่ายประสาทเทียมที่นำเสนอสามารถกระทำได้โดยง่าย ผลของการใช้วิธีโครงข่ายประสาทเทียมสามารถนำมาเปรียบเทียบกับวิธีการของวายบัสเมทริกซ์ ปรากฏว่าโครงข่ายประสาทเทียมสามารถคำนวณได้อย่างถูกต้องแม่นยำ และสามารถเรียนรู้ได้เป็นอย่างดี

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