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ESTIMATION OF PROBABLE
EARTHQUAKE GROUND MOTIONS IN BANGKOK

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ถึงแม้ว่ากรุงเทพมหานครจัดว่าอยู่ในเขตที่แผ่นดินไหวไม่รุนแรง แต่ยังอาจมีความเสี่ยงเนื่องจากมีประชากรหนาแน่นและเป็นศูนย์กลางทางเศรษฐกิจของประเทศ ในการกำหนดเกณฑ์การออกแบบอาคารต้านทานแผ่นดินไหวที่เหมาะสมจำเป็นจะต้องประมาณความรุนแรงของความสั่นสะเทือนที่อาจจะเกิดขึ้นได้อย่างค่อนข้างถูกต้อง ซึ่งในการนี้ต้องใช้สมการลดทอนคลื่นแผ่นดินไหวที่ใช้หาค่าความเร่งสูงสุดของพื้นดินเมื่อทราบขนาดและระยะห่างจากศูนย์กลางแผ่นดินไหว การศึกษานี้ทำการประเมินความเหมาะสมของสมการลดทอน 18 ชุดที่ได้มีการเสนอไว้เดิมซึ่งถูกพัฒนาจากข้อมูลแผ่นดินไหวจำนวนมากในต่างประเทศจากบริเวณที่มีแผ่นดินไหวบ่อยครั้ง ทั้งแผ่นดินไหวแบบตื้นในเปลือกโลกและแบบที่แผ่นเปลือกโลกมุดตัว เพื่อเลือกสมการที่เหมาะสมกับประเทศไทยที่สุด โดยเปรียบเทียบค่าจากสมการต่างๆ กับข้อมูลจริงที่บันทึกได้โดยกรมอุตุนิยมวิทยาจำนวน 557 บันทึก ซึ่งเกิดจากแผ่นดินไหว 430 เหตุการณ์ การประเมินความสอดคล้องของสมการลดทอนกับข้อมูลความสั่นสะเทือนที่บันทึกได้จริงทำโดยพิจารณาค่ารากที่สองของค่าเฉลี่ยของค่ากำลังสองของผลต่างระหว่างค่าที่ทำนายโดยสมการลดทอนกับค่าที่บันทึกได้ ผลปรากฏว่าสมการของ Idriss (1993) ให้ค่าที่ใกล้เคียงกับข้อมูลที่บันทึกได้ในประเทศไทยมากที่สุด จากนั้นการศึกษานี้ได้รวบรวมข้อมูลรอยเลื่อนมีพลังที่ใกล้กรุงเทพมหานครที่สุดพร้อมขนาดของแผ่นดินไหวสูงสุดที่อาจจะเกิดขึ้นได้จากรอยเลื่อนนั้น เพื่อประมาณความรุนแรงของความสั่นสะเทือนที่อาจจะเกิดขึ้นได้ที่กรุงเทพมหานคร โดยใช้สมการลดทอนที่เหมาะสม จากนั้นศึกษาการขยายความรุนแรงของความสั่นสะเทือนเนื่องจากชั้นดินเหนียวอ่อนบริเวณกรุงเทพมหานครโดยใช้โปรแกรม Shake

ภาควิชา...วิศวกรรมโยธา... ลายมือชื่อนิสิต ...muriel naguit...
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Although Bangkok is considered to have low seismic hazard, the risk may be high because of its large population and economic importance. To establish appropriate seismic resistant design criteria, intensity of earthquake ground motions needs to be estimated with reasonable accuracy. This estimation involves an attenuation model, which is a predictive relationship of ground motion intensity measure, e.g., peak ground acceleration, as a function of seismic parameters such as earthquake magnitude and distance to source. In this study, eighteen attenuation equations previously developed for shallow crustal earthquakes in both active tectonic and stable continental regions, and for subduction earthquakes were evaluated to determine the most suitable model for Thailand. A total of 557 ground motions recorded by the Meteorological Department of Thailand (TMD) from 430 earthquake events comprise the data set to be compared against the estimates from attenuation models. Attenuation curves for magnitude ranging from 4 to 9 were plotted and compared to the field records. The square root of mean square (RMS) of the difference between attenuation model estimates and the actual records was computed to quantify how well the attenuation model predicts the ground motions. It was found that the attenuation model proposed by Idriss in 1993 has the lowest RMS. To estimate probable earthquake ground motion in Bangkok, information about the nearest active fault and its maximum magnitude were reviewed and the most suitable attenuation models was used. Finally, amplification of ground motions due to soft clay underlying Bangkok was simulated by Shake software.

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