

Characteristics of Interaction Forces Acting on a Newly-Design Rotary Blade for Thai Walking Tractor

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Abstract : This research aimed to indeed understand the soil-rotary blade interaction of the newly-design rotary blade for Thai walking tractor. Therefore, this study was carried out to clarify the characteristics of the horizontal and the vertical forces and the moment around a rotary shaft of prototype rotary blade 15° lengthwise slice angle. It was set up and tested in laboratory soil bin at Kasetsart University under sandy loam and clay soil at soil dry bulk density and soil specific weight of 9.81 kN/m³ and 11.3% (d.b.), respectively. The tests were conducted at travel speeds of 0.069 and 0.142 m/s and rotational speeds of 150, 250 and 350 rpm. The characteristic of pushing-forward and lifting-up forces and moment around a rotor shaft were obtained by using the EOR transducer. Also, the acting point of resultant force of these soil-blade reaction forces was determined. The pushing-forward and lifting-up forces, moment around a rotor shaft and resultant force increased at higher travel speed and higher soil moisture content. In tilling stage, the acting points of resultant force located inside the circumstance of the blade locus. The results showed that the variation of magnitude and direction of pushing-forward, lifting-up and resultant forces corresponded to soil-blade interaction of the newly-design in tilling stage.

Keywords : rotary blade, soil-blade interaction, walking tractor, clay, sandy loam

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