

## LIST OF REFERENCES

- Anonymous. California trenching and shoring manual (CTSM) Chapter 4: Earth pressure theory and application. Retrieved 27<sup>th</sup> Nov. 2004, from the World Wide Web: [http://www.dot.ca.gov/hq/esc/construction/Maual/TrenchingandShoring/ch4\\_earth.pdf](http://www.dot.ca.gov/hq/esc/construction/Maual/TrenchingandShoring/ch4_earth.pdf).
- Aref, K. S., W. J. Chancellor and D. R. Nielson. 1975. Dynamic shear strength properties of unsaturated soils. *Transactions of the ASAE*, 18: 818 – 823.
- ASAE 1994. *ASAE Monograph No. 12*. Pamela De Vore-Hansen Ed. American Society of Agricultural Engineers, 2950 Niles Road, St Joseph, Michigan, USA.
- ASAE Standards. 2000. *ASAE Standards* (47<sup>th</sup> Ed.). ASAE EP291.2 DEC98: Terminology and definitions for soil tillage and soil-tool relationships. American Society of Agricultural Engineers. St. Joseph, Mich. USA.
- Ayers, P. D. 1987. Moisture and bulk density effects on soil shear strength parameters for coarse grained soils. *Transactions of the ASAE*, 31: pp. 1282–1287.
- Azyamova, E. N. 1963. Studies of dynamics of deformation of soil. Trudy (TSNIIMESKH) Minsk 1:131-139. (Translated by W.R. Gill, National Tillage Machinery Laboratory, USDA-ARS, Auburn, AL).
- Bailey, A. C. and J. A. Weber. 1965 : Comparison of methods of measuring soil shear strength using artificial soils. *Trans. ASAE* 8(2), 153-156,
- Baloch, J. M., S. B. Bukhari., J. Kilgour and A.Q.A. Mughal. 1986. Performance of power tiller blades. *Agricultural Mechanisation in Asia, Africa and Latin America*, 17(1):22 – 26.
- Bardet, J. 1997. *Experimental Soil Mechanics*. Prentice Hall. ISBN: 0133749355.

- Beeny, J. M. and D. J Greig. 1965. The efficiency of a rotary cultivator. *Journal of Agricultural Engineering Research*, 10(1):5 – 12.
- Beeny, J. N. 1973. Rotary cultivation of wet land-comparison of blade shapes. *Journal of Agricultural Engineering Research*, 18(3):224 – 251.
- Beeny, J. N. and D.C.P Khoo. 1970. Preliminary investigations into the performance of different shaped blades for rotary tillage of wet rice soil. *Journal of Agricultural Engineering Research*, 15(1):27 – 33.
- Bentley, J. P. 1995. *Principles of measurement systems*. Longman Scientific & Technical, Longman Group UK Limited.
- Bernacki, H., J. Haman and Cz. Kanafojski. 1972. *Agricultural machines, theory and construction*. US Department of Commerce, National Technical Information Service, Springfield, Virginia 22151.
- Bosoi, E. S., O. V. Verniev, I. I. Smirnov and E. G. Sultan-Shakh. 1988. *Theory construction and calculations of agricultural machine. Volume 1*. Russian Translation series 66. A.A. Balkema Rotterdam.
- Bukhari, K. H., S. Bukhari, M. M. Leghari and M. S. Memon. 1996. The effect of speed and rear shield on the performance of rotary tiller. *Agricultural Mechanization in Asia, Africa and Latin America* 27(2):9 - 14.
- Butterfield, R. and K. Z. Andrawes. 1972. On the angles of friction between sand and plane surfaces. *Journal of Terramechanics*, 8(4): 15 – 23.
- Camp, C. R and W. R. Gill. 1969. The effect of drying on soil strength parameters. *Soil Sci. Am. Proc.* 33: 641 – 644.
- Chamen, W. C. T., R. E. Cope and D. E. Patterson. 1979. Development and performance of a high output rotary digger. *Journal of Agricultural Engineering Research* 24: 301 – 308.

- Chancellor, W. J. 1994. Chapter 2 - Soil physical properties. In: *Advances in Soil Dynamics Volume 1*. ASAE Monograph Number 12.
- Chancellor, W. J. and J. A. Vomcil. 1971. The relation of moisture content to failure strength of seven agricultural soils. *Transactions of the ASAE*, 13(1): 9 – 13, 17
- Chi, L. and R. L. Kushwaha. 1989. Finite element analysis of forces on a plane soil blade. *Canadian Agricultural Engineering* 31(2): 135 – 140.
- Chi, L. and R. L. Kushwaha. 1990. A nonlinear 3-D finite element analysis of soil failure for tillage tools. *Journal of Terramechanics* 27(4):343 – 366.
- Chi, L. and R. L. Kushwaha. 1991a. Finite element analysis of forces on two shapes tillage tools. *Canadian Agricultural Engineering* 33(1): 39 – 45.
- Chi, L. and R.L. Kushwaha. 1991b. Three-dimensional, finite element interaction between soil and simple tillage tool. *Transactions of the ASAE*, 34(2): 361-366.
- Destan, M. F. and K. Houmy. 1990. Effects of design and kinematic parameters of rotary cultivators on soil structure. *Soil & Tillage Research*, 17 (1990): 291 – 301.
- Doebelin, E. O. 2004. *Measurement systems. Applications and design*. 5<sup>th</sup> Edition. Tata McGraw-Hill Publishing. ISBN 0-07-058203-3.
- du Plessis, H. L. M. 2004. Personal communication. Department of Civil and Biosystems Engineering, University of Pretoria, Pretoria, South Africa.
- El-Domiaty, A. M. and W. J. Chancellor. 1970. Stress-strain characteristics of a saturated clay soil at various rates of strain. *Transactions of the ASAE*, 13: 685 – 689.
- Erbach, D. C. 1987. Measurement of soil bulk density and moisture. *Transactions of the ASAE*, 30(4):922 – 932.

- Fielke, J. M. 1999. Finite element modelling of the interaction of the cutting edge of tillage implements with soil. *Journal of Agricultural Engineering Research* 74: 91-101
- Fleniken, J. M, R. E. Hefner and J. A. Weber. 1977. Dynamic soil strength parameters from unconfined compression tests. *Transactions of the ASAE*, 20: 21 – 29.
- Gardner, W. H. 1986. Water Content. In *Methods of soil analysis, Part I. Physical and Mineralogical Methods*, 2<sup>nd</sup> Ed., ed. A Klute, 493 – 544. Madison, Wis.: American Society of Agronomy.
- Ghosh, B. N. 1967. The power requirement of a rotary cultivator. *J. Agric. Eng. Res.* 12(1): 5 – 12.
- Gill, W. R. and G. E. Vanden Berg. 1967. *Soil dynamics in tillage and traction*. Agricultural Handbook No. 316. Washington D.C., US GPO.
- Girma, G. 1989. Measurement and prediction of forces on plough bodies. I – Measurement of forces and soil dynamic parameters. *Proceedings of the Eleventh International Congress on Agricultural Engineering*. Dublin, Sept. 4 – 9, pp 1539 – 1546.
- Gitau, A. N., Gumbe, L. O. and Biamah E. K. (2006). Influence of soil water on stress strain behaviour of a compacting soil in semi-arid Kenya. *Soil and Tillage Res.* 89 (2006): 144 – 154.
- Glancey, J. L., S. K. Upadhyaya, W. J. Chancellor and J. W. Rumsey. 1996. Prediction of agricultural implement draft using an instrumented analog tillage tool. *Soil and Tillage Research*, 37: 47 – 65.
- Godwin, R. J. and M. J. O'Dogherty. 2006. Integrated soil tillage force prediction models. *Journal of Terramechanics*, 44: 3 – 14.
- Godwin, R. J., Spoor, G., 1977. Soil failure with narrow tine. *Journal of Agricultural Engineering Research*. 22(3): 213 – 228.

- Goering, C. E. 1992. *Engine and tractor power*. ASAE Textbook No. 3. American Society of Agricultural Engineers 2950 Niles Road, St Joseph, Michigan, USA.
- Grisso, R. D. and J. V. Perumpal. 1985. Review of Models for Predicting Performance of Narrow Tillage Tools. *Transactions of the ASAE*, 28(4): 1062 – 1067.
- Gupta, C. P., and R. Visvanathan. 1993a. Dynamic behaviour of saturated soil under impact loading. *Transactions of the ASAE*, 36(4): 1001 – 1007.
- Gupta, C. P., and R. Visvanathan. 1993b. Power requirements of a rotary tiller in saturated soil. *Transactions of the ASAE*, 36(4): 1009 – 1012.
- Hendrick, J. G. 1980. A rotary chisel. *Transactions of the ASAE*, pp 1349 – 1352.
- Hendrick, J. G. and A. C. Bailey. 1982. Determining components of soil-metal friction sliding resistance. *Transactions of the ASAE*, 25(4): 845 – 849
- Hendrick, J. G. and W. R. Gill. 1978. Rotary tiller design parameters, V: Kinematics. *Transactions of the ASAE*, 21(4): 658 – 660.
- Hendrick, J.G. and W.R. Gill. 1971a. Rotary tiller design parameters: Part I - Direction of rotation. *Transactions of the ASAE*, 14(4): 669-674, 683.
- Hendrick, J.G. and W.R. Gill. 1971b. Rotary tiller design parameters: Part II – Depth of tillage. *Transactions of the ASAE*, 14(4): 675-678.
- Hendrick, J.G. and W.R. Gill. 1974. Rotary tiller design parameters: Part IV – blade clearance angle. *Transactions of the ASAE*, 17(1): 4 – 7.
- Hendrick, J.G. and W.R. Gill. 1976. The irregularities of soil disturbance depth by circular and rotating tillage tools. *Transactions of the ASAE*, 19(2): 230– 233.
- Hendrick, J.G. and W.R. Gill. 1971c. Rotary tiller design parameters: Part III-Ratio of peripheral and forward velocities. *Transactions of the ASAE*, 14(4): 679 – 683
- Hettiaratchi, D.R.P. and A.R. Reece. 1967. Symmetrical three-dimensional soil failure. *Journal of Terramechanics* 4(3): 45-67.

- Hettiaratchi, D.R.P. and A.R. Reece. 1974. The calculation of passive soil resistance. *Geotechnique* 24(3): 289-310.
- Hettiaratchi, D.R.P., B.D. Witney and A.R. Reece. 1966. The calculation of passive pressure in two dimensional soil failure. *Journal of Agricultural Engineering Research* 11(2): 89-107.
- Hillel, D. 1980. *Fundamentals of Soil Physics 1<sup>st</sup> Ed.* New York, NY: Academic Press, Inc.
- Hottinger Baldwin Messtechnik. 1999. *Spider8 operating manual*. PC measurement electronics, Spider8 and Spider8-30. HBM Mess-und Systemtechnik GmbH, Germany
- Hryciw, R. D., S. A. Raschke, A. M. Ghalib, D. A. Horner and J. F. Peters. 1997. Videotracking for experimental validation of discrete element simulations of large discontinuous deformations. *Computer and Geotechnics*. 21(3): 235-253.
- Johns, R. A. 2000. *Probability and statistics for engineers*. Pearson Education. ISBN 81-780-529-1.
- Johnson, C. E., R. D. Grisso, T. A. Nichols and A. C. Bailey. 1987. Shear measurement of agricultural soil – a review. *Transaction of the ASAE*, 30(4):935 – 938.
- Karmakar, S. and R. L. Kushwaha. 2005a. Simulation of soil deformation around a tillage tool using computational fluid dynamics. *Transactions of the ASAE*, 48(3): 923 – 932.
- Karmakar, S. and R. L. Kushwaha. 2005b. CFD Simulation of soil forces on a flat tillage tool. ASABE paper No. 051160. St Joseph, ASABE.
- Kataoka, T. and S. Shibusawa. 2002. Soil-blade dynamics in up-cut-rotational rotary tillage. *Journal of Terramechanics*, 39(2002): 95 – 113.

- Kataoka, T., K. Onodera, S. Shibusawa and Y. Ota,. 1998. Layer mixing of different blades of reverse-rotational rotary tiller. *Proceedings of the 5<sup>th</sup> Asia-Pacific Regional Conference of the ISTVS*, Seoul Korea, October 20 – 21, pp 233 – 240.
- Kataoka, T., K. Onodera, S. Shibusawa and Y. Ota. 1995. A model for backward throwing of sliced soil clods by a reverse-rotational rotary tiller using rigid body kinetics. *Proceedings of the 4<sup>th</sup> Asia-Pacific Regional Conference of the ISTVS*, Okinawa, Japan, November 20 – 21, pp 339 – 346.
- Katsygin, V. V. 1964. Relation of draft of agricultural machines to operation speeds. *Voprosy Sel'skohozyaistvennoi Mekhaniki*, Section 2, 96-119, Vol. XII. (Translated by W.R. Gill, National Tillage Machinery Laboratory, USDA-ARS, Auburn, AL).
- Kepner, R. A., R. Bainer and E. L. Barger. 1978. *Principles of farm machinery*. Westport, Conn.: AVI Publishing Inc.
- Khat, L. R., V. M. Salokhe and H. Jayasuriva. 2005. Experimental validation of distinct element simulation for dynamic wheel-soil interaction. ASAE Paper No. 053120. Presented in Annual International Meeting, 17-20 July, 2005, Tampa Convocation Center, Tampa, Florida, USA.
- Kinzel, G. L., R. Holmes and S. Huber. 1981. Computer graphics analysis of rotary tillers. *Transactions of the ASAE*, 1392 – 1395 & 1399.
- Koolen, A. J. and H. Kuipers. 1983. *Agricultural soil mechanics*. Springer-Verlag. ISBN 3-540-12257-5.
- Kuipers, H. and B. Kroesbergen. 1966. The significance of moisture content, pore space, method of sample preparation and type of shear annulus use on laboratory torsional shear testing of soil. *Journal of Terramechanics*, 3(4): 17 – 28.

- Kushwaha, R. L. and J. Shen. 1995. Finite element analysis of the dynamic interaction between soil and tillage tool. *Transactions of the ASAE*, 37(5): 1315-1319.
- Kushwaha, R. L., L. Chi and J. Shen. 1993. Analytical and numerical models for predicting soil forces on narrow tillage tools – A review. *Canadian Agricultural Engineering*, 35(3): 184 – 193.
- Lambe, T. W. 1951. *Soil testing for civil engineers*. John Wiley & Sons. ISBN 0-471-51183-8.
- Lee, K. S., S. H. Park, W. Y. Park and C. S. Lee. 2003. Strip tillage characteristics of rotary tiller blades for use in a dryland direct rice seeder. *Soil & Tillage Research* 71(2003): 25 – 32.
- Levine, D. M., P. Ramsey and R. Smidt. 2000. *Applied statistics for engineers and scientists: using Microsoft Excel & Minitab*. Prentice Hall. ISBN: 0134888014
- Mandal, J. N. and D.G **Divshikar**. **1994**. *Soil testing in civil engineering*. India Book House Limited. ISBN: 8120409035
- Manian, R. and K. Kathirvel. 2001. Development and evaluation of an active-passive tillage machine. *Agricultural Mechanization in Asia, Africa and Latin America*, 32(1): 9 – 18.
- Marenya, M. O. and H. L. M. du Plessis. 2006. Torque Requirements and Forces Generated by a Deep Tilling Down-Cut Rotary Tiller. ASABE Paper No. 061096. St Joseph, Michigan, USA.
- Marenya, M. O., H. L. M. du Plessis and N. G. Musonda. 2003. Theoretical force and power prediction models for rotary tillers – a review. *Journal of Engineering in Agriculture and the Environment* 3(1): 1 – 10.
- Marenya M. O. and G. O. Nyakiti. 2000. Compaction of acrisols as influenced by incorporation of fresh sugarcane factory filter-press mud. *Agricultural Engineering in South Africa*, Vol 31 No. 1 pp 56 – 61.



- McKyes, E. 1989. *Agricultural engineering soil mechanics*. Developments in Agricultural Engineering 10. Elsevier Publishing Co.
- McKyes, E., 1985. In: *Soil Cutting and Tillage*, Elsevier, Amsterdam, the Netherlands, p. 217.
- McKyes, E. and Ali, O.S., 1977. The cutting of soil by narrow blades. *Journal of Terramechanics*. 14 2, pp. 43–58
- Meyerhof, G. G. 1951. The ultimate bearing capacity of foundations. *Geotechnique 2*: pp 301 – 332.
- Miszczak, M., 2005. A torque evaluation for a rotary subsoiler. *Soil & Tillage Research*. 84(2): 178-183.
- Meriam, J. L and L. G. Kraige. 1987. *Engineering mechanics: dynamics*, Volume 2. John Wiley & Sons. ISBN: 13-978-0471 739 319.
- Montgomery, D. C. and G. C. Runger. 2003. *Applied probability and statistics for engineers*. 3<sup>rd</sup> Edition. John Wiley & Sons, Inc.
- Mouazen, A. M. and H. Ramon. 2002. A numerical–statistical hybrid modelling scheme for evaluation of draught requirements of a subsoiler cutting a sandy loam soil, as affected by moisture content, bulk density and depth, *Soil Tillage Research* 63 (2002), pp. 155–165.
- Mouazen, A. M. and M. Nemenyi. 1999. Finite element analysis of subsoiler cutting in non-homogeneous sandy loam soil. *Soil & Tillage Research* 51: 1-15.
- Neal, M. S. 1966. Friction and adhesion between soil and rubber. *Journal of Agricultural Engineering Research*, 12(1): 83 – 87.
- O'Callaghan, J. R. and K. M. Farrelly. 1964. Cleavage of soil by tined implements. *Journal of Agricultural Engineering Research*. 9 (3): 259–270.

- Olsen, H. J. 1984. A torsional shearing device for field tests. *Soil & Tillage Research* 4(6):599 – 611.
- Osman, J. S. 1964. The mechanics of soil cutting blades. *Journal of Agricultural Engineering Research*. 9(4): 313 – 328.
- Owende, P. M. O. and S. M. Ward. 1996. Characteristic loading of light mouldboard ploughs at slow speed. *Journal of Terramechanics*, 33 (1):29-53
- Payne, P. C. J. 1956. The relationship between the mechanical properties of soil and the performance of simple cultivation implements. *Journal of Agricultural Engineering Research* 1(1): 23-50.
- Payne, P. C. J. and D.W. Tanner. 1959. The relationship between rake angle and the performance of simple cultivation implements. *Journal of Agricultural Engineering Research* 4(4): 312-325.
- Perumpal, J. V., R. D. Grisso and C. S. Desai. 1983. A Soil-Tool Model Based on Limit Equilibrium Analysis. *Transactions of the ASAE*, 26(4): 991 – 995.
- Prasad, J. 1996. A comparison between a rotavator and conventional tillage equipment for wheat-soybean rotations on a vertisol in Central India. *Soil & Tillage Research*, 37 (1996): 191 – 199.
- Raper, R. L. 2000. The influence of implement type, and tillage timing on residue burial. *Transaction of the ASAE*, 45(5):1281 – 186.
- Reece, A. R. 1965. The fundamental equation of earth-moving mechanics. In: *Symposium on Earth Moving Machinery Proc. Inst. Mech. Eng.* 179, pp. 16–22.
- Robinson, D. H., R. L. Schafer, and C. E. Johnson. 1988. Minimizing tillage energy due to sliding resistance. *ASAE Paper No. 87-1580. St Joseph, Michigan: ASAE.*
- Romig, B. E. 1971. Performance of rotary tiller blades. *Transactions of the ASAE*, 14(1): 10 -13.

- Ros, V., R. J. Smith, S. J. Marley and D. C. Erbach. 1995. Mathematical modeling and computer-aided design of passive tools. *Transaction of the ASAE*, 38(3):675 – 683.
- Salokhe, V. M. and N. Ramalingam. 2001. Effects of direction of rotary tiller on properties of Bangkok clay soil. *Soil & Tillage Research*, 63(1): 64 – 74.
- Salokhe, V. M., M. Hanif and M. Hoki. 1993. Effect of blade type on power requirement and puddling quality of a rotavator in wet clay. *Journal of Terramechanics*, 30(5): 337 – 350.
- Schafer, R. L., C. W. Bockop and W. G. Lovely. 1963. Vane and torsion for measuring soil shear strength. *Transactions of the ASAE*: 57 – 59.
- Schjønning, P. 1986. Shear strength determination in undisturbed soil at controlled water potential. *Soil & Tillage Research*, 8 (1986):171 – 179.
- Shen, J and L. R. Kushwaha. 1998. *Soil–Machine Interaction: a Finite Element Perspective*, Marcel Dekker Inc., New York. USA.
- Shibusawa, S. 1993. Reverse-rotational rotary tiller for reduced power requirements in deep tillage. *Journal of Terramechanics*, 30(3): 205 – 217.
- Shinners, K. J., J. M. Wilkes and T. D. England. 1993. Performance characteristics of tillage machine with active-passive components. *Journal of Agricultural Engineering Research*, 55: 277 – 297.
- Sineokov, G. N. and I. M. Panov. 1978. *Theory and calculation of soil working machines*. Translated for the U.S Department of Agriculture, Agricultural Research Service and the National Science Foundation, Washington D.C.
- Smith, J. L. 1964. *Strength-moisture relations of fine-grained soil in vehicle mobility research*. U.S. Army Engineers Waterways Experiment Station, Technical Report No. 3 - 636. Vicksburg, MS.

- Spoor, G and R. J. Godwin. 1978. An experimental investigation into the deep loosening of soil by rigid tines. *J. Agric. Eng. Res.* 23(3): 243 – 258.
- Spoor, G. and R. J. Godwin. 1979. Soil deformation and shear strength characteristics of some clay soils at different soil moisture content. *Journal of Soil Science*, 30: 483 – 498.
- Srivastava, A. K., C. E. Goering and R. P. Röhrbach. 1993. *Engineering principles of agricultural machines*. ASAE Textbook No. 6. American Society of Agricultural Engineers 2950 Niles Road, St Joseph, Michigan, USA.
- Stafford, J. V. 1979. The performance of rigid tine in relation to soil properties and speed. *Journal of Agricultural Engineering Research* 24(1): 41-56.
- Stafford, J. V. and D. W. Tanner. 1977. The frictional characteristics of steel sliding on soil. *Journal of Soil Science*, 28: 541 – 553.
- Stafford, J. V. and D. W. Tanner. 1983b. Effect of rate on soil shear strength and soil-metal friction. II. Soil-metal friction. *Soil & Tillage Research*, 3(4): 321 – 330.
- Stafford, J. V. and D. W. Turner. 1983a. Effect of rate on soil shear strength and soil-metal friction. I. Shear Strength. *Soil and Tillage Research*, 3(3): 245 – 260.
- Terzaghi, K. 1959. *Theoretical soil mechanics*. John Wiley and Sons, Inc. New York.
- Thakur, T. C. and R. J. Godwin. 1989. The present state of force prediction models for rotary powered tillage tools. *Journal of Terramechanics*. 27(2):121 – 138.
- Thakur, T. C. and R. J. Godwin, 1990. The mechanics of cutting by a rotating wire. *Journal of Terramechanics*. 27(4):291 – 305.
- Vetrov, Y. A. and V. P. Stanevski. 1972. The investigation of the factors of the speed of cutting soils. *Mining Construction and Highway Machines* 8: 21-26. Translated by W.R. Gill, National Tillage Machinery Laboratory, Auburn, AL.

- Walters, T. and R. Owen. 1996. *A collection of technical formulae*. 8<sup>th</sup> English Edition. Giek Verlag, D – 82110, Germering.
- Wells, L. G. and O. Treesuwan. 1978. The response of soil strength indices to changing water content and bulk density. *Transactions of the ASAE*: 854 – 861.
- Yong, R. N. and A.W. Hanna. 1977. Finite element analysis of plane soil cutting. *Journal of Terramechanics* 14(3): 103-125.
- Zeng, D. and Y. Yao. 1992. A dynamic model for soil cutting by blade and tine. *Journal of Terramechanics* 29(3): 317-327.
- Zhang, J. and R. L. Kushwaha. 1995. A modified model to predict soil cutting resistance. *Soil and Tillage Res.* 34: 157 – 168.
- Zhang, Z. X. and R. L. Kushwaha. 1999. Operating speed effect on the advancing soil failure zone in tillage operation. *Canadian Agricultural Engineering* 41(2): 87-92.