

Comparative analysis of various solar irradiance models for a tilted surface

ANDRZEJ CHOCHOWSKI, DARIUSZ CZEKALSKI

Department of Fundamental Engineering, Warsaw Agricultural University – SGGW

Abstract: *Comparative analysis of various solar irradiance models for a tilted surface.*

Basing on 10-year measurements on solar irradiance on south-exposed surface, a deterministic model of this irradiance was developed. It is used in simulation investigations on solar systems. The results obtained from this model were compared with other models worked out with consideration of isotropic or anisotropic properties of solar scattered radiation component.

Key words: renewable energy sources, irradiance models

A deductive-probabilistic model of alliums convectional drying

EWA GOLISZ, MAŁGORZATA JAROS

Department of Fundamental Engineering, Warsaw Agricultural University – SGGW

Abstract: *A deductive-probabilistic model of alliums convectional drying.* There are presented a deductive-probabilistic model of changes in water content and the results of simulation of leek drying process, with utilization of this model with random coefficient n . A formula for k_0 coefficient of initial drying velocity and empirical distribution of n coefficient were used. There are presented diagrams of model temperature changes with random coefficients. Due to such approach to modeling of investigated process, it was possible to analyze the range of probable changes in water content or temperature in the particles of alliums chips. The results are presented graphically.

Key words: convectional drying, kinetics, leek, onion, water content, randomness

Investigations on mass dynamic pressure in discharge channel and power requirement for driving the forage harvester during grass chopping¹

JACEK KLONOWSKI, ALEKSANDER LISOWSKI, MICHAŁ SYPUŁA

Department of Agricultural and Forest Machinery, Warsaw Agricultural University – SGGW

Abstract: *Investigations on mass dynamic pressure in discharge channel and power requirement for driving the forage harvester during grass chopping.* There is presented the effect of cut mass stream, knife disc rotational speed, and number of cutting knives on dynamic pressure force of mass in the discharge channel and power requirements for driving forage harvester units during grass chopping. It was found that power values were statistically different for all the analyzed factors, while the dynamic pressure force varied depending on the mass stream and knife disc rotational speed.

Key words: plant material cutting, thickness of cut layer, dynamic pressure force, total power requirement for forage harvester

Effect of mycorrhiza on mountain pine and thuja plicatoides of Szmaragd variety in container cultivation

JERZY KUBIAK

Department of Production Management and Engineering, Warsaw Agricultural University – SGGW

Abstract: *Effect of mycorrhiza on mountain pine and thuja plicatoides of Szmaragd variety in container cultivation.* The effect of mycorrhiza on mountain pine and thuja plicatoides of Szmaragd variety cultivated in containers was investigated. Mycelium was applied with the use of applicator, which was innovative development of Kwazar firm. A positive effect of mycorrhiza on the plant annual growth and number of buds was found. Application of plant pesticides was eliminated.

Key words: applicator, mountain pine, mycorrhiza, thuja plicatoides

Exhaust gases emitted by professional chain saws

KRZYSZTOF WÓJCIK

Department of Agricultural and Forest Machinery, Warsaw Agricultural University – SGGW

Abstract: *Exhaust gases emitted by professional chain saws.* The composition and harmfulness of exhaust gases emitted by a two-stroke engine in the chain saws are discussed. There are presented investigations carried out on three chain saws of various engine capacities in several operational states, and also possibilities for reduction of exhaust gas emission.

Key words: chain saws, exhaust gases, two-stroke engine, gas emission, exhaust gas composition

Improvement of free-stall maintenance systems for milking cows based on analysis of behaviour factor

MAREK GAWORSKI

Department of Production Management and Engineering, Warsaw Agricultural University – SGGW

Abstract: *Improvement of free-stall maintenance systems for milking cows based on analysis of behaviour factor.* The work aimed at analysis of milking cow maintenance in pens in the cowshed with free-stall maintenance system. Basing on videotapes illustrating various forms of cow activity, the time of occupancy of particular lying stalls was determined. There were distinguished the groups of stalls of the shortest and longest occupancy time during forty four hours. The preferences towards usage of lying stalls were determined depending on their position in the pen.

Key words: behaviourism, cow, preferences, lying stall, free-stall maintenance system

Analysis of the effect of basic design and exploitation parameters of the rotary subsoiler on its specific work

MACIEJ MISZCZAK

Department of Fundamental Engineering, Warsaw Agricultural University – SGGW

Abstract: *Analysis of the effect of basic design and exploitation parameters of the rotary subsoiler on its specific work.* There are presented results of investigations on energy inputs of

the rotary subsoiler and the changes in soil compaction as a result of subsoiler's operation. There were investigated two shapes of working elements, three values of their spacing, two values of kinematic coefficient, and three values of outfit's ground speed. The specific work values were calculated for particular measurement variants and the effect of particular factors on specific work was analyzed.

Key words: rotary subsoiler, deep tillage, field investigations

Diagnostics of Common Rail injection system used in agricultural vehicles and machinery

REMIGIUSZ MRUK

Department of Production Management and Engineering, Warsaw Agricultural University – SGGW

Abstract: *Diagnostics of Common Rail injection system used in agricultural vehicles and machinery.* There are presented methods of investigations and results enabling to determine the course of fuel pressure changes in the injection system as a result of many working parameters. These investigations were used in development of quantitative models of pressure adjustment process with the use of polynomial regression, neuron nets and fuzzy logic. Then, an algorithm of diagnostic method was developed, enabling to determine technical condition of investigated system and its numerical form. In the last stage, the obtained numerical forms of diagnostic methods were investigated with a computer system to determine operational speed of particular solutions.

Key words: Common Rail, self ignition, diagnostics, neuron nets, fuzzy logic, injection systems

Analysis of inputs on silage production of short-stem green forage

STANISŁAW GACH

Department of Agricultural and Forest Machinery, Warsaw Agricultural University – SGGW

Abstract: *Analysis of inputs on silage production of short-stem green forage.* The following technologies of silage production of short-stem green forage are analyzed and evaluated:

harvesting of the whole plants with rolling baler – technology Z1, harvesting of the whole plants with ram baler for large rectangular bales – technology Z2, harvesting of chopped plants with trailed forage harvester – technology Z3, harvesting of chopped plants with self-propelled forage harvester – technology Z4, harvesting of chopped plants with pick-up trailer – technology Z5. In most of these technologies there are variants considering various solutions for collecting, transport, storing and preservation of partially dried green forage, thus, 9 technologies have been considered. The carried out simulation experiments enabled to determine the criteria indices assumed as: specific fuel consumption, specific labour inputs and specific costs.

Key words: harvesting and ensilage of short-stem green forage, energy and economic inputs

Evaluation of operational effectiveness of skidders and forwarders with application of computer simulation models

WITOLD ZYCHOWICZ

Department of Agricultural and Forest Machinery, Warsaw Agricultural University – SGGW

Abstract: *Evaluation of operational effectiveness of skidders and forwarders with application of computer simulation models.* There are described three simulation operational models of skidding vehicles: cable skidder, grapple skidder and forwarder. The influence of several factors on the effects of vehicle operation was considered. The following variable factors were taken into account: skidding distance, size of load, method of load preparation (forwarder and grapple skidder), method of load skidding (grapple skidder), number of skidded assortments, dimensions of assortments and number of operators (skidder with yarder). It is also possible to analyze a series of other factors, e.g. type and configuration of ground, organization of production process. The real mode and course of skidding vehicle operation is represented with the use of appropriate record of working cycles of the machines being modeled and the structure of working shift. There are presented the results of carried out simulation experiments, which allow for verification of proper operation of computer programs. In every model the calculations were performed for the vehicles and areas, previously investigated empirically. A high conformity of simulation results and site investigations was found in most of cases.

Key words: computer simulation, mathematical model, skidding, exploitation effectiveness and costs