UNIVERSITY OF ŽILINA

Faculty of Civil Engineering
Department of Structures and Bridges

STEEL STRUCTURES AND BRIDGES 2012

23rd Czech and Slovak International Conference

EXTENDED ABSTRACTS

September 26 – 28, 2012, Hotel Permon, Podbanské, Slovakia

ORGANIZED BY

Department of Structures and Bridges
University of Žilina, Faculty of Civil Engineering

IN COOPERATION WITH

Slovak Association of Steel Construction
Czech Constructional Steelwork Association

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Determination and analysis of influence of the hydrodynamic, kinematic and geometric parameters on the motor vehicles hydrodynamic clutch characteristics

Ružica R. Nikolić[1,2*], Božidar Krstić[1], Vukić Lazić[1], Ilija Ž. Nikolić[1], Srbislav Aleksandrović[1], Ivan Krstić[3], Vojislav Krstić[4]

[1]Faculty of Engineering, University of Kragujevac, Sestre Janjić 6, 34000 Kragujevac, Serbia

[2]Faculty of Civil Engineering, University of Žilina, Univerzitna 8215/1, 01026 Žilina, Slovakia

[3]Faculty of Technical Sciences, University of Kosovska Mitrovica, Kneza Miloša 7, 38220 Kosovska Mitrovica, Serbia

[4]Faculty of Transport and Traffic Engineering, University of Belgrade, Vojvode Stepe 305, 11000 Belgrade, Serbia

*ruzicarnikolic@yahoo.com

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In this paper, a steel structure of a motor vehicle hydrodynamic clutch (HDC) is analyzed in order to obtain the optimal design parameters. Realization of such a steel structure with those parameters enables achieving of the optimal efficiency coefficient. The paper presents large number of data, originated from the past research, which may be used in determination of the meridian cross-section shapes and the position of blade circuits within the operating space of the hydraulic turbo converter. The experimental results concerning the influence of the geometric, kinematic and hydrodynamic parameters on characteristics of the hydraulic turbo converter are presented also. The knowledge about all those relations may be very useful to all dealing with hydraulic torque converters. For conducting experimental investigations an indirect measuring method was used, based on defining the pressure distribution over the speed probes' walls. The original experimental equipment was developed for that purpose.

The hydro-dynamic power transmitter's task is to transform the flow energy of the working fluid, which is circulating through the inter-blades space, into the mechanical work (turbine circuit) or vice versa, to transform the external mechanical work into flow energy of the working fluid. Within the hydrodynamic clutch (HDC) working space the energy exchange is executed between the working fluid and the blades, by change of the working fluid's angular momentum. In this paper is presented an attempt to express the relation between the energetic hydrodynamic, kinematic and geometric parameters of the HDC, using the one-dimensional flow theory.

At low values of the skidding coefficient, the meridian component of the fluid flow speed has a small value and it varies very little between the blade circuits. The value of the perimeter speed then has the maximum value, thus the pressure distribution (static and dynamic) determines the law of variation of the perimeter component of the absolute speed in this space.

At smaller values of clearance between the HDC blade circuits, higher values of fluid flow and stoppage pressures are possible, as well as higher values of the meridian and perimeter components of the fluid flow absolute speed and the lower values of the fluid flow skidding angle, thus the higher values of the fluid flow tension in the HDC working circuits.

In experiments with blades with the forward slope of the pump circuit, one obtains significantly less favorable results than those obtained with radial blades of the turbine and the pump circuits. This is confirmed by results obtained for the fluid flow skidding angle.

Based on the listed observation regarding the experimental results, one can conclude that the shape and sizes of the HDC working space have decisive influence on the fluid flow form in that space.