SUMMARIES
РЕЗИМЕА

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APPLICATION POSSIBILITIES OF SIMILARITY THEORY AND DIMENSIONAL ANALYSIS IN DESIGNING PROCESS OF INTERNAL COMBUSTION ENGINES INTAKE MANIFOLD

Abstract

Similarity theory and dimensional analysis have significant application in modeling process, testing and projecting of turbo machines, airplanes and watercrafts (ships). It is possible to "map" a real physical object by following laws of similarity theory into its equivalent model whose characteristics, dimensions above all, enable experimental research in laboratory conditions. This is especially important in cases of modeling of physical objects with considerable dimensions (turbines, airplanes, ships), where creation of a prototype of such dimensions would mean a large expenditure of material and inability of confined laboratory testing. Characteristic example for something like that would definitely be airplane model testing and aerodynamic tunnel car testing, laboratory testing of turbine and ship models etc.

This study shows and analyses attempts of similarity theory and dimensional analysis application on internal combustion engines (ICE). For construction complexity reasons and working cycle, in this case it is not rational to build an ICE model. Benefit of similarity law application is in possibility to determine characteristic values from similarity of existent and newly projected engine, above all dimensions of a new engine. In this specific case usability of similarity laws and dimensional analysis in process of intake system projection in rapid Otto engine have been analyzed by using non-steady models.

Dynamical processes that occur during work matter exchanging make influential parameters analysis and their optimal values selection significantly more complex. Similarity laws and dimensional analysis in that case enable easier determination of basic dimension of newly projected intake manifold, which should produce a positive effect of dynamical processes during intake.

Key words: similarity, dimensional analysis, model, dimensionless coefficient