

Problems of assessing the effectiveness of CAE-complexes in the design of offshore structures



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Offshore Platforms



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CAE Systems

- The article analyzes the effectiveness of the application when designing offshore engineering analysis systems, which are collectively called CAE. Currently, the production of offshore oil and gas resources, which are extracted using offshore hydraulic structures, is actively developing. These structures are offshore stationary platforms (SMEs) of pile type for various purposes. Offshore platforms are subject to various loads and are in a difficult stress state. The calculation of their real stress state is a difficult task. A solution to this complex problem can be found by building a computer model in a specialized CAE software package. To date, a large number of CAE systems with various functionalities have been developed. In this regard, a technique is needed to evaluate the effectiveness of a specific CAE software package to solve the problem of assessing the stress state of a stationary marine platform. The author offers his own methodology for assessing the effectiveness of CAE packets and gives an example of its practical application.



Principle of ABC -method

- (A) major functions, which are indispensable for the execution of the considered problem;
- (B) sub - functions contributing to the core functions or their complements;
- (C) redundant features, which do not contribute to the evaluation of the stress state of offshore platforms, but increase the cost of the package CAE



Table 1. Comparative table of CAE package functionality

Function	Name of the CAE package			
	CAE-1	CAE-2	...	CAE-n
1	+	-	...	+
2	-	-	...	+
...
n	+	+	...	+



Table 2. Comparative table of the functionality of the CAE packages

Function	Name of the CAE package			
	CAE-1	CAE-2	...	CAE-n
Functions of the group «A»				
1	+	-	...	+
2	-	-		+
...
n	+	+	...	+
Functions of the group «B1»				
1	-	+	...	+
2	-	-		+
...
n	-	+	...	+
...				
Functions of the group «C»				
1	+	+	...	+
2	+	-		+
...
n	+	-	...	+



The coefficient of efficiency of the CAE package is calculated by the formula

$$E = \frac{a \cdot B_1 + x \cdot B_2 + y \cdot B_3}{K},$$

Where:

E – a coefficient of effectiveness of the CAE package

K – a cost of using the CAE package;

a, x, y – the number of functions of class "B";

B_1, B_2, B_3 – functions of class «B».



Table 3. Comparative analysis of the effectiveness of CAE complexes for solving the problem of analysis of the stress state of a marine stationary platform

	SCAD Office	Dassault Systemes Solid Works	Ansys	Sofistik AG	Lira	Abaqus
Functional Points	72	85	95	68	69	73
Price for 1 version rub. *	100 000	1 289 000	3 567 200	538 000	525 000	710 000
Ratio coefficient (Point/price)	$0.72 \cdot 10^{-3}$	$0.07 \cdot 10^{-3}$	$0.03 \cdot 10^{-3}$	$0.13 \cdot 10^{-3}$	$0.13 \cdot 10^{-3}$	$0. \cdot 10^{-3}$
* – prices are approximate, based on open data on the cost of PC from the manufacturer or official distributors						



Thank you for your attention!



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