

Operads are objects that model operations with several inputs and one output. We define such structures in the context of graphs, namely oriented trees. Then we generalize operads to properads and modular operads by taking general graphs with, or without, orientation.

Further we construct the cobar complex of operads and properads and illustrate the construction on the examples of the associative operad Ass and the Frobenius properad Frob . Algebras over the cobar complex of operads correspond to certain homotopy algebras, for our example of Ass it is A_1 . We find its Maurer-Cartan equation and convert it from coderivations to derivations. Similarly we find the Maurer-Cartan equation for cobar complex of Frobenius properad.