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Features of the Circuit Calculation Equivalent Generator Method in DC Drive Systems

The equivalent generator method is efficient in case when it is necessary to find current, voltages, or power in single branch. Whereat all the rest of circuit part with which this branch is connected will be considered in the form of active one-port scheme.

We differentiate the two modifications of equivalent generator method: the equivalent EMF (electromotive force) source and the equivalent current source.

The equivalent EMF’s source method is based on Tevenin’s theorem, according to which the current in any linear electric circuit branch will not change if active one-port scheme connected with this branch is replaced by equivalent EMF source with output voltage equal to open-circuit voltage and with internal resistance equal to equivalent input resistance of passive one-port scheme.

The equivalent current’s source method is based on Norton theorem, according to which the current in any branch of linear electric circuit will not change if active one-port scheme connected with this branch is replaced by equivalent current source with output current equal to current of the short circuit of this brunch, and with internal conduction equal to equivalent input conduction in the part of open branch.

When we apply equivalent EMF’s source method in order to determine current in some branch first of all we must disconnect branch with unknown current and find open circuit EMF (E_{xx}), than equivalent internal resistance (R_{in}) of passive one-port scheme and finally determine unknown current in branch. If we use equivalent current’s source method we should shunt resistance from which the unknown current flows and find one-port scheme short circuit current (I_{sc}) at the beginning, after that obtained equivalent resistance (R_{in}) of passive one-port scheme and by method of current divider obtain unknown current.

As we can see it’s more convenient and reasonable to use equivalent generator method when we need to find current, voltage or power in single branch. If we use other method such as a mesh current method or try to find current according to Kirchhoff’s laws we obtain a large number of equations and it will be difficult to resolve this equations.