- thermo-visco-elastic-plastic inclusive materials damageability at creeping and hydrogen corrosion;
- thermo-visco-elastic-plastic inclusive materials damageability at creeping and hydrogen corrosion with damageability areas propagation kinetics.

At developing this methodology the following was used: the linearized by the method of additional strains correlations of the theory of nonisothermal processes of elastic-plastic straining of solid body's elements in the path of flatness; kinetic equations of materials' damageability at creeping and hydrogen corrosion.

Using the developed methodology a range of applied problems on stress-strain analysis of single- and multilayer envelopes of rotation at various loading conditions, and that is:

- uniformly heated up three-layer cone shell rotating with constant angular velocity;
- double-layer spherical shell with various banding and loaded with intrinsic pressure;
- thin double-layer envelope of rotation with an irregular shape of meridian in the form of a vessel at its internal pressure loading;
- double-layer rotation shell representing an axial compensator loaded simultaneously with intrinsic pressure and shifting motion of its end faces;
- uniformly heated up cyclic plane dependent upon high-temperature hydrogen from one of the sides.

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SECONDARY POWER SOURCES WITH CAPACITORS IN POWER CIRCUIT

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Single-phase secondary power sources (SPS), due to their little specific gravity (kg/kW) and quick response, got wide spread occurrence within the limits of power from tens of W (household audio- and video facilities) to some kW (electronic voltage stabilizers, plasmatron ion source feed elements of moderate capacity, electric arc welding devices, etc.) [1].

One of significant disadvantages of a "classical" SPS is a low phase factor (F_p) equal to 0,3…0,4 and conditioned by impulse character of the consumed current from the system.

For the purpose of the F_p increase an active filter on the input of the invert circuit is used, which is sometimes called the F_p adjuster. For the filter power key control a range of well known firms ("Micro Linear", "Simens", "Motorolla") have developed special electronic chips providing quasi-continuous character of the line current and F_p increase up to 0,86 with simultaneous invert circuit constant-voltage regulation [2].

In [1,3] a modified algorithm of active filter control and the scheme of the algorithm realization are offered, that provides the F_p increase up to 0,95 and more meeting the hardest demands of the IEC (IEC-1000-3-2).

Notice that the SPS power part complication connected with the active filter application is made up with the fact that together with the F_p increase and invert circuit out voltage stabilizing treatment the filter condenser capacity value decreases by about 60 %.

Further SPS updating in terms of specific gravity decrease and loss enhancement, for example, has the following limitations:

- because of the invert circuit out voltage unbalance the power isolating transformer is performed gapped in the heart and is used only in the incremental hysteresis loop, that makes the bicyclic invert circuit bridge network be non-effective compared to a single-pulse one, and, finally, leads to the transformer mass-volume showings increase;
- the invert circuit out voltage line-locked frequency increase allows reducing the transformer and smoothing inductor frames, however, the power transistors' losses increase at that. The last especially matters for powerful SPS.

The switching on the capacitors in series into the power transformation primary circuit allows excluding the invert circuit out voltage continuous component, and also, in some cases, reducing commutative losses in power transistors.

Two SPS networks with condensers in the invert power circuit are considered below: a half-bridge and full-bridge ones.

The half-bridge network provides a push-pull transformer work mode with a total absence of continuous component in the voltage curve. It allows using the heart without air isolation and with high degree of hysteresis loop rectangularity. Hence, the transformer frames and its losses can be reduced (at the same frequency) two-fourfold compared to the networks [2] without condensers.

The indisputable advantage of this network is the invert power circuit simplicity (push-pull mode is provided by only two power transistors). Respectively, the controlling system is also simplified.

The bridge network provides a push-pull transformer work mode and, respectively, its full use. The quantity of power transistors and outlets of the invert circuit controlling system in this network is twice as many, however, there is only one commutating capacitor and its band capacitance is eight times as much against the total capacitance of the capacitors in the half-bridge network.

Reduction of the compared versions to one and the same load gives absolutely identical both gain and rectified voltage regulation characteristics of the invert circuits. Voltages across power transistors in both versions are also identical and equal to the voltage of the invert circuit input; however, the current amount through the bridge invert circuit is twice as little. Hence, the total "installed capacity" of the power transistors in both networks is equal.

Conclusions:

1. Including capacitors into the power transformer primary invert circuit gives an opportunity to apply the heart of this transformer without air isolation, with little field current and using on a complete hysteresis loop, that allows reducing its mass-volume showings essentially.
2. In permanent output the current through invert circuit transistors has an intermittent nature, i.e. the transistors' commutation is currentless, losses are minimal, that allows increasing the line-locked frequency and, respectively, decreasing mass-volume showings of the SPS.
3. The two considered SPS networks with capacitors in the power circuit are identical on their voltage regulation characteristics, however, the bridge network (excepting the low power SPS) are preferable against the half-bridge one.

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TRANSISTOR CHOPPERS FOR ELECTRIC-ARC WELDING

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A disadvantage of native and foreign secondary power sources (SPS) designed for electric welding is the fact that current amplitude in the invert circuit power transistors of the specified SPS designed for electric welding units is great and makes about one third of the load current output, i.e. in the electric arc. The specified disadvantage is explained by the fact that in order to stabilize the electric arc "combustion" and its easy "ignition" the denoted devices designers have to make the matching transformer secondary voltage greatly overstated compared to the arc voltage and equal to about 100V.

At the same time it is known that in practice the arc voltage does not exceed 25V when welding in the air, and when welding in CO_2 and argon the arc voltage is considerably lower. The described disadvantage, i.e. voltage uprating, leads, first - to cost and power excursion of the invert circuit transistor; second - to their losses increase.

For this essential fault elimination a new SPS network [3] is offered, in which the matching