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High Power Microwave Pulse Compressors With a Variable Geometry of Accumulative Resonant Cavity

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This work describes a new approach for designing large accumulative resonant cavities of high power microwave pulse compressors by replacing a fixed shape (cylinder, sphere, prism) microwave compressor resonator with a variable geometry accumulative resonant system. Such a system is designed based on the standard structure element made as one mode or moderately multimode waveguide section whose ends are limited with two waveguide tees or their analogues. One arm of each limiting tee or an analogue is connected to the section; another arm is closed-circuited, and the third arm is open. The accumulative system is formed as extended linear or compact planar and voluminal structures or their compositions by alignment of standard elements through open arms of tees. The proposed approach to the accumulative system design allows adapting the system geometry according to the assembly place and integrates the microwave compressor into the working unit with saving or minimizing its dimensions.

This work provides specific schemes of possible microwave pulse compression system variants with a variable geometry of the accumulative system. The authors show that a specific architecture of accumulative system accompanied by the relevant distribution of energy output equipment may allow making microwave compressors with output pulse parameters that are discretely controlled over wide range. It is also shown that the variable geometry of the accumulative resonant cavity will enable design of compact compression cascade systems with multiplied power of the resonant cavity travelling wave. The work also demonstrates the first results of experimental study of the microwave pulse compression systems with planar accumulative resonant cavities.

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