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Convoluted Solutions in Supergravity

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Inspired by the convoluted solutions for two intersecting M2 branes in eleven-dimesnional supergravity, in which one brane in the system is completely localized along the overall and relative transverse coordinates while the other brane in the system is localized only along the overall transverse coordinates, we construct two classes of exact solutions to Einstein-Maxwell theory in six and higher dimensions. We show that the membrane configuration preserves four supersymmetries and upon dimensional reduction, the solutions provide intersecting configurations of three D-branes in type IIA supergravity. Moreover, we show that the metric functions in six and higher dimensions can be written as convolution-like integrals of two special functions. The solutions are regular everywhere and show a bolt structure on a single point in any dimensionality.

Also, we find the exact nonstationary solutions to the Einstein-Maxwell theory with positive cosmological constant. We show that the cosmological solutions are expanding patches in asymptotically de Sitter spacetime.

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