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# World-volume supersymmetry from spacetime supersymmetry of the four-dimensional supermembrane

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### Abstract

The  $d = 4$  spacetime, supersymmetric, supermembrane action is the effective action for domain walls in supersymmetric field theories. It is shown to reduce, in a ‘physical gauge’, to a  $N = 2$  supersymmetric extension of the three-dimensional Volkov-Akulov action, which exhibits a ‘partial breaking of global supersymmetry’ to  $N = 1$ . A similar result holds for the  $d = 2$  superparticle for which the world-line superspace form of the gauge-fixed action is found. A consequence of the unbroken  $N = 1$  world-volume supersymmetry is the vanishing of the quantum correction to the classical energy of static membrane configurations.



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