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Counterexamples to the Nelson-Seiberg theorem

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The Nelson-Seiberg theorem and its extension relate supersymmetry breaking and R-symmetries in Wess-Zumino models, and found applications in phenomenology model building. We show that there are counterexample models with generic superpotential coefficients and non-generic R-charge assignment for fields. These models have more R-charge 2 fields than R-charge 0 fields, but give SUSY vacua with spontaneous R-symmetry breaking. So they are counterexamples to both the Nelson-Seiberg theorem and its extensions. The pattern of R-charge assignment is discussed, and we provide a sufficient condition for counterexamples.

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