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Microscopic calculations with noniterative finite amplitude methods and the application to neutron radiative captures and inelastic scatterings

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We derive the fully self-consistent quasiparticle random-phase approximation (QRPA) equations with noniterative finite amplitude methods and calculate the transition strengths of giant resonances. Then, we apply the QRPA results to both neutron radiative capture calculations based on the statistical Hauser-Feshbach theory and inelastic scattering calculations based on distorted-wave Born approximation (DWBA). We compare the calculated results with available experimental data and demonstrate how our approach can reproduce giant resonances and various nuclear reactions.

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