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Giant resonances in neutron-rich nuclei studied with TDHF simulation in the continuum

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In weakly bound systems such as neutron-rich nuclei, the continuum plays an important role in the ground and excited states. Many-body correlations in low-density nuclear matter is an interesting subject in nuclear structure physics and have a significant impact on nuclear reactions as well. We study excited and resonance states in the continuum with time-dependent Hartree-Fock theory in the linear regime. In order to treat the nucleonic continuum, we adopt the absorbing boundary condition which has been often utilized in calculations of atomic collision. The method is equivalent to the continuum RPA theory, but it is applicable to systems without spherical symmetry. Dynamical properties of nuclear vibrations and their damping is investigated in real-time simulation of the small-amplitude TDHF. We show giant resonances in stable and unstable (neutron-rich) nuclei and discuss possible effects on low-energy reactions.