

Impact of context on students' conceptual understanding about mechanical wave speed

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This work analyses student understanding about propagation speed of the mechanical wave from different contexts using a model estimation of the model analysis technique. The modified version of the mechanical waves conceptual survey was administered to the first-year engineering (ENG, N = 644) and the second-year physics (PHYS, N = 37) university students. Corresponding contexts of the survey were related to sound, waves on a string, and a problem involving basic explanation without context. We identified the distribution of students' responses into four common models. The two groups showed differences and inconsistencies in the probability of using the models. Alternative conceptions become more apparent with different contexts especially for ENG students, but this is contrary to a question worded without a context. The most popular idea for ENG and PHYS students is that wave speed depends on its frequency. By applying the inner product between the primary eigenvectors of the ENG and PHYS class, we computed a projection angle of about 18 degrees. The similar trend of the class's model state vectors indicates the influence of contexts on the responses of students. These results may support researchers in designing their assessment instruments.

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