

Stability of Shear-Flexible Frames

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Most studies of postbuckling and imperfection sensitivity of frame structures assume shear inflexibility. Here, we present theoretical, numerical, and experimental results for a shear-flexible sandwich realization of a particular frame, the so-called "Roorda Frame." When dealing with sandwich beams and frames it is very important noticing that the meaning of a rigid joint or a clamped support is different than for the case of shear inflexibility. For frames consisting of shear-inflexible materials the buckling loads are well separated, and separation decreases for increasing shear flexibility. Although experimental and numerical results of postbuckling behavior and imperfection sensitivity of frames of sandwich materials agree well, their determination entails serious difficulties in comparison with the equivalent problem for frames made of shear-inflexible materials. Modeling of the cross-sectional properties must be given special attention. Special finite elements must be used in order to avoid shear and membrane locking.

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