If for no other reason than to emphasize that there is a certain arbitrariness in the model we have outlined for ethylene, here we consider a somewhat different one. Having mixed carbon's orbitals to form three equivalent trigonal planar $sp^2$ atomic orbitals and a left-over $2p_z$ orbital perpendicular to the plane, as we have already in Segment 7.03, we can perform a further mixing of the $2p_z$ orbital ("all p") with one of the $sp^2$ orbitals ("two-thirds p"), yielding two new hybrid orbitals having one part s character and five parts p character, called $\tau$, or "bent bond" orbitals:

Using these orbitals to construct ethylene leads to a picture in which the double bond is composed of two equivalent $\tau$, or "bent" bonds:
The $\sigma/\pi$ and $\tau$ bond models for ethylene are based on alternative, quantitatively equivalent, mathematical constructions. The qualitative use of either model in an attempt to describe "reality" must lead to some (not necessarily the same) loss of information. Both models predict a double bond, and a correspondingly short bond length. Both models predict a planar geometry, and the existence of cis-trans isomerism. For many applications the $\sigma/\pi$ model yields explanations that are more easily grasped than equivalent explanations using the $\tau$ model. We soon shall see several powerful examples of this statement. On the other hand, there are other situations where the $\tau$ bond picture may give a more easily approachable explanation, or may illuminate an analogy that otherwise might be missed. For example, the favored conformation of propene (known from microwave spectroscopy) is perhaps most simply apprehended as having all three C—H bonds of the methyl group exactly staggered with respect to the bonds at the adjacent carbon atom, two of the latter bonds being modeled as $\tau$ bonds:
favored conformation of propene

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