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A simplified focal model constructed with prastic spheres and slinky springs

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In the high-school earth-science text books, it is written that the P-wave first motions of an earthquake show a four quadrant distribution, which is related to the focal mechanism. However the detail of mechanism about this phenomenon is never shown. Among the seismology text book, although there are many introduction about this quadrant polarity using mathematical formula, which is too difficult to understand for non-professionals. Therefor, we developed a simplified focal model with cheap cost and easy construction.

By this model we can demonstrate the relation between the focal mechanism and the P-wave first arrivals for educational and outreach purposes. The model consists of 1) Two transparent plastic half spheres purchased at home centers eg. Tokyu Hands. 2) Two acrylic plates 3) Four Slinky Springs(plastic springs can be used as alternatives) attached to spheres with tapes. Two alternate plates mimic a buried fault and a sudden dislocation of this fault causes an earthquake. If the fault moves, the four slinky springs attached to two plastic spheres might show compressional or dilatational first P-wave motions consistent with the fault geometry. We can observe the detail of this phenomenon with high speed video movies. In our tests of this model, we can barely recognize the polarity of the first motions. We also try to improve our model to carry out more comprehensive demonstration.

Keywords: focal sphere, P-wave first motion, earthquake mechanism, fault, slinky spring