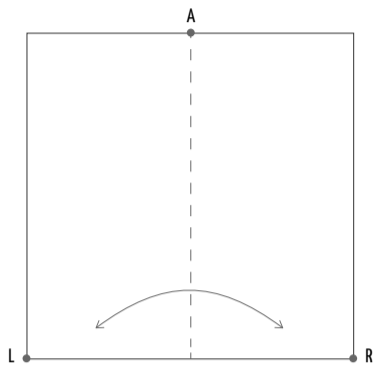


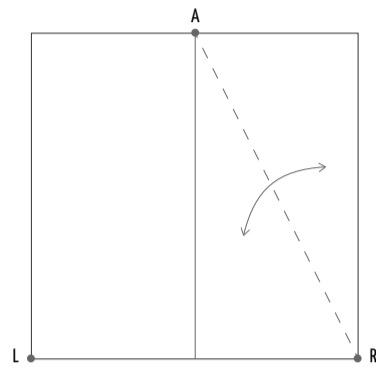
# One-fold Origami Construction of Robert Geretschläger's Easy Pentagon

Dmitri Nedrenco

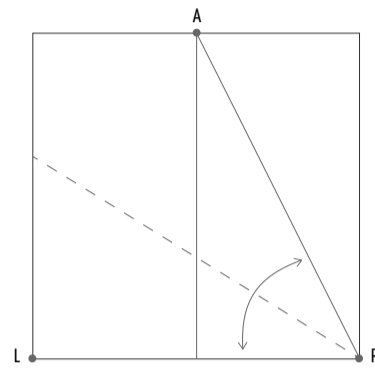
June 9, 2015



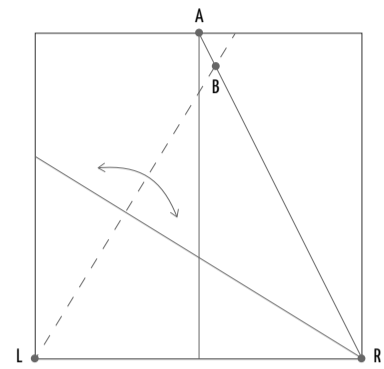
**i** Fold the perpendicular bisector of the lower side  $LR$  of the square, creating the midpoint  $A$  of the upper side. *HJ2*



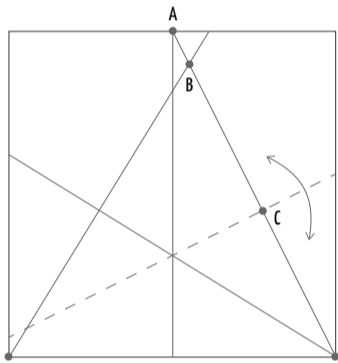
**ii** Fold the line  $AR$ . *HJ1*



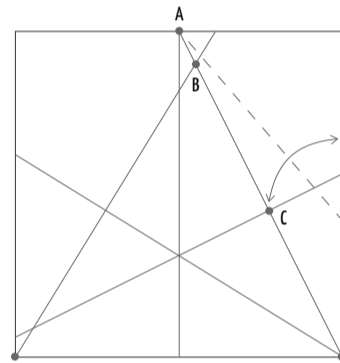
**iii** Fold  $AR$  on the  $LR$ , creating an angle bisector of the two lines. *HJ3*



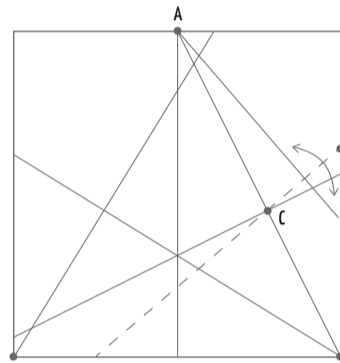
**iv** Fold the angle bisector from step **iii** onto itself through  $L$ , creating the point  $B$ . Note that  $\overline{BR}$  has the length  $\sqrt{5} - 1 = 2\phi$ . *HJ4*



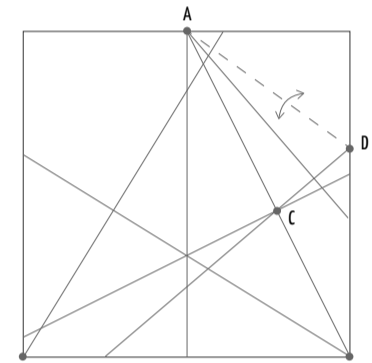
**v** Fold the perpendicular bisector of  $\overline{BR}$ , creating the midpoint  $C$ . The length of  $\overline{BC}$  is  $\phi$ . *HJ2*



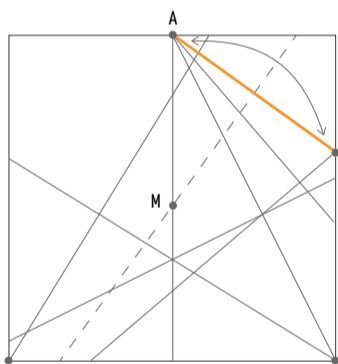
**vi** Fold  $C$  onto the right side of the square such that the fold line passes through the point  $A$ . We wish to transport  $B$  and  $C$  on the sides of the square. *HJ5*



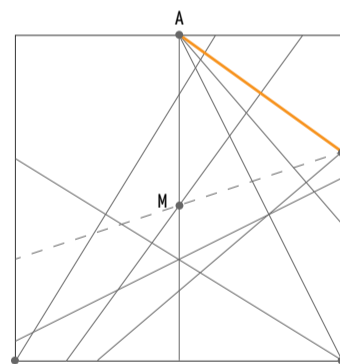
**vii** Fold now the line from the previous step onto itself through  $C$ . The point  $D$  is the intersection of the fold line and the right side of the square. *HJ4*



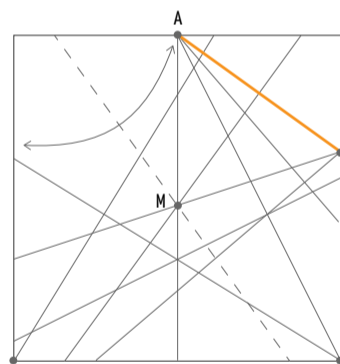
**viii** Fold  $AD$ . The length of  $\overline{AD}$  is  $\phi$  as it should be for a side of a our pentagon. *HJ1*



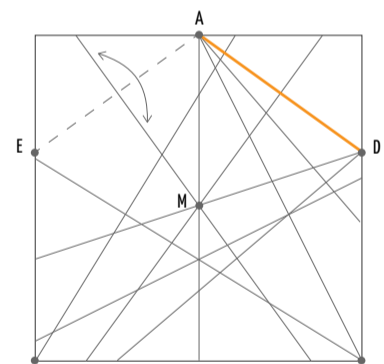
**ix** Fold the perpendicular bisector of  $\overline{AD}$  creating the center  $M$  of the pentagon as this fold line and the line from step **i** are symmetry axes of the pentagon. *HJ1*



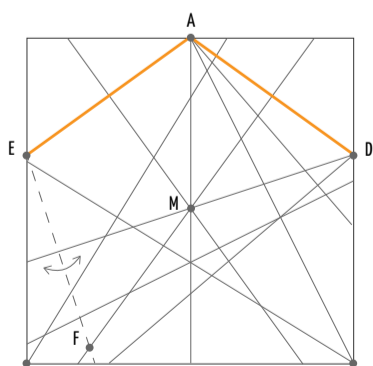
**x** Fold the line  $DM$ , it is a symmetry axes, too. *HJ2*



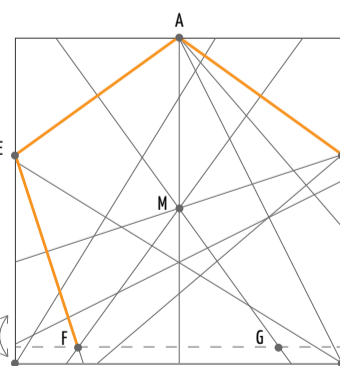
**xi** It is difficult to transport  $\overline{AD}$  directly, so we use various symmetries to construct the other sides of the pentagon. Fold  $A$  onto the left side through  $M$ . *HJ5*



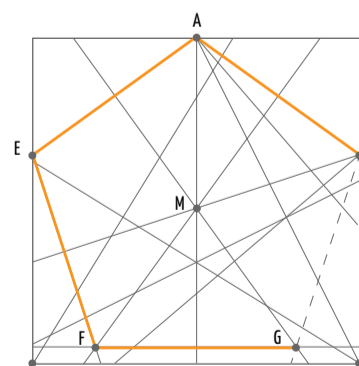
**xii** Fold the fold line from the previous step onto itself through  $A$  to produce  $E$ , i.e. the image point of  $A$  on the left side. By symmetry  $\overline{AE}$  has the right length,  $\phi$ . *HJ4*



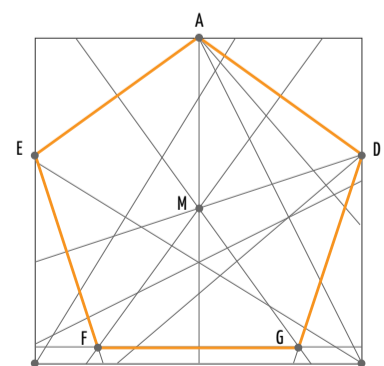
**xiii** Fold the line  $DM$  onto itself through  $E$  to create  $F$ , the image point of  $E$  in the reflexion across  $DM$ . *HJ4*



**xiv** Fold left side onto itself through  $F$  producing  $G$  as intersection point of the fold line and one symmetry axes through  $M$ . *HJ4*



**xv** Join by folding the points  $D$  and  $G$  in order to get the fifth side of the regular pentagon. *HJ2*



**xvi** Now we have a regular pentagon  $DAEFG$ .