A new optimality property of Strang's splitting

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For systems of the form $\dot q = M^{-1} p$, $\dot p = -Aq+f(q)$, common in many applications, we analyze splitting integrators based on the (linear/nonlinear) split systems $\dot q = M^{-1} p$, $\dot p = -Aq$ and $\dot q = 0$, $\dot p = f(q)$. We show that the well-known Strang splitting is optimally stable in the sense that, when applied to a relevant model problem, has a larger stability region than alternative integrators. This generalizes a well-known property of the common St\"{o}rmer/Verlet/leapfrog algorithm, that of course arises from Strang splitting based on the (kinetic/potential) split systems $\dot q = M^{-1} p$, $\dot p = 0$ and $\dot q = 0$, $\dot p = -Aq+f(q)$. Joint work with F. Casas and L. Shaw.