1096-05-165 **Arni S.R. Srinivasa Rao***, Georgia Regents University, Augusta, GA 30912, and **Damer Blake** and **Fiona Tomley**. *Straight and Non-overlapping Walk on $n \times n$ Grid: Hamiltonian and Rectifiable Paths.*

A configuration for a maximum possible distance through a straight non-overlapping walks (defined in this paper) on a square *grid graphs* is one of the key questions addressed. An area $S \in \mathbb{R}^2$ either with even number of cells ($2n \times 2n$) or with odd number of cells ($(2n+1) \times (2n+1)$) is placed on a *grid graph*, G, which is a subset of an *infinite graph,* G^∞. Our main result says, when S has dimension $2n \times 2n$ ($n >$1) then there always exists at least one configuration for which the walk between $K(i,j)$ and $K(i',j')$ is maximum, i.e. $(2n)^2 - 1$ units, under the hypotheses of straight walk and non overlapping walk and when $S_{ij}(i,j)$ and $S_{i'j'}(i',j')$ have two common vertices between them or $S_{ij}(i,j)$ and $S_{i'j'}(i',j')$ are adjacent cells. If $S_{ij}(i,j)$ and $S_{i'j'}(i',j')$ are non adjacent cells then there doesn't exists a configuration under the same hypotheses for which the walk between $K(i,j)$ and $K(i',j')$ is maximum. We also pose an open problem on multiple walks on finite *grid graphs.* (Received August 12, 2013)