Let $\mathcal{O}$ be the ring of integers of a totally real number field $E$ and set $G := \text{Res}_{E/Q}(\text{GL}_2)$. For each pair of ideals $m, c \subset \mathcal{O}$, let $T(m)$ denote the $m$th Hecke operator associated to the standard compact open subgroup $U_0(c)$ of $G(\mathbb{A})$. Setting

$$X_0(c) := G(\mathbb{Q}) \backslash G(\mathbb{A}) / K_\infty U_0(c),$$

where $K_\infty$ is a certain subgroup of $G(\mathbb{R})$, we use $T(m)$ to define a Hecke cycle

$$Z(m) \in IH_{2[E:Q]}(X_0(c) \times X_0(c)).$$

Here $IH_\bullet$ denotes intersection homology. We use Zucker’s conjecture (proven by Looijenga and independently by Saper and Stern) to obtain a formula relating the intersection numbers $Z(m) \cdot Z(n)$ to the trace of $T(m) \circ T(n)$ considered as an endomorphism of the space of Hilbert cusp forms on $U_0(c)$. (Received September 27, 2005)