On Diophantine equations involving
Thabit and Williams numbers base b

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Abstract. Let $b \geq 2$ be a positive integer. Let r and s be two integers with $r \geq 1$, $s \in \{-1, 1\}$ and $\Delta = r^2 + 4s > 0$, let $\{U_n\}_{n \geq 0}$ be the Lucas sequence given by $U_{n+2} = rU_{n+1} + sU_n$, with $U_0 = 0$ and $U_1 = 1$. In this paper, we investigate the solutions of the Diophantine equations

$$U_n \pm U_m = (b \pm 1) \cdot b^\ell \pm 1,$$

by giving effective bounds for the variables n, m and ℓ in terms of b, r and s. Moreover, we solve the above equation in the cases where $2 \leq b \leq 10$, by considering the Fibonacci, Pell and balancing sequences.

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