Abstract. The structure of graded triangular algebras $\mathcal{T}$ of arbitrary dimension are studied in this paper. This is motivated in part for the important role that triangular algebras play in the study of oriented graphs, upper triangular matrix algebras or nest algebras. It is shown that $\mathcal{T}$ decomposes as $\mathcal{T} = \mathcal{U} + (\sum_{i \in I} \mathcal{T}_i)$, where $\mathcal{U}$ is an $R$-submodule contained in the 0-homogeneous component and any $\mathcal{T}_i$ a well-described (graded) ideal satisfying $\mathcal{T}_i \mathcal{T}_j = 0$ if $i \neq j$. Since any $\mathcal{T}$ is not simple as associative algebra, the concept of quasi-simple triangular algebra is introduced as those $\mathcal{T}$ which are as near to simplicity as possible. Under mild conditions, the quasi-simplicity of $\mathcal{T}$ is characterized and it is proven that $\mathcal{T}$ is the direct sum of quasi-simple graded triangular algebras which are also ideals.

Key words. Triangular algebra, Graded algebra, Simplicity, Structure theory.

AMS subject classifications. 15A78, 16W50, 16D20, 16D70.