Meeting: 1007, Santa Barbara, California, SS 10A, Special Session on Complexity of Computation and Algorithms

1007-68-47 **Mark Burgin***, Departmentof Mathematics, UCLA, Los Angeles, CA 90095. *Complexity of problems and duality of measures.*

To construct measures for problem complexity, we build the goal-oriented classification of problems. Let X be a set and $P(x)$ be a predicate. **Definition 1**. A search problem (denoted: $SP(X)$): find an object from X such that it satisfies $P(x)$. **Definition 2**. A construction problem (denoted: $CP(X)$): construct an object from X such that it satisfies $P(x)$. **Definition 3**. A test problem (denoted: $TP(X)$): find if an object from X satisfies $P(x)$. **Proposition**. It is possible to reduce search and test problems to construction problems. Let A be an algorithm from $\mathbf{K}$ that works with elements from I and $Sc : I \to \mathbf{N}$ be a static complexity measure [M.Burgin, Superrecursive Algorithms, Springer, 2005]. **Definition 4**. The dual to m complexity measure of $CP(X, \mathbf{K})$ w. r. t. A is defined as $m^o_A(CP(X, \mathbf{K})) = min\{m(p); p \in I, A(p) = x \in X$ and $P(x) = T\}$. Let a class $\mathbf{K}$ has a universal algorithm and satisfies additional conditions. **Theorem**. For any axiomatic static complexity measure m on $\mathbf{K}$, predicate $P(x)$ and some recursively computable set $\mathbf{H}$ of functions, there is a $\mathbf{H}$-optimal dual measure $m^o(CP(X, \mathbf{K}))$. Algorithmic complexity is an example of such a measure. (Received January 05, 2005)