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Generation of plasma inhomogeneities and of magnetic field by convective motions in the photosphere

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Theoretical basics are proposed for inter-relevance of such phenomena in the solar atmosphere as (a) localized concentrations of magnetic field at the bases of coronal magnetic arcs, (b) chromospheric spicules, (c) screwed coronal magnetic field tubes, (d) energy flux of Alfvénic waves directed from below into the corona. We have studied the structure of photospheric currents localized in the vicinity of supergranule boundaries, those currents being driven by convective motions of the matter. At the level of the "dynamo layer", in the weakly ionized plasma, the electron and ion motions differ extremely: due to collisions, ions are dragged along by the flow of neutrals while electrons drift in crossed electric and magnetic fields. Currents are maintained by the electric field arising because of charge separation between ions and electrons. On the other hand, the field generates an Alfvénic disturbance propagating upwards, into the corona, and also magnetic-field-aligned currents associated with that disturbance. The specific type of that electric "load" results in unambiguity of parameters of the field and current system.