Membrane potentials induced by external rotating electrical fields.

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Abstract: *For electrorotation measurements of cell properties, cells are positioned in a rotating electric field, generated by a System of four electrodes. The membrane potentiale induced by such fields were calculated for single-, two-, and three-shell models. This simulates the Situation of cells like erythrocytes that contain a single membrane System, protoplasts with a vacuole, or plant cells covered by a cell' wall. The influence of the outside field on cell organelles was also calculated. Differentes between alternating and rotating fields are discussed. A measuring chamber was developed which allowed the production of rotating fields up to 40 kV/m. The effects of such fields on the rotational behavior of plant protoplasts (Kalanchoe daigremontiana, Avena sativa) are discussed. Dielectric breakdown of protoplasts induced by rotating fields is investigated to check the theoretical predictions.*